9-2815-207-35

TM 9-2815-207-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL AND REPAIR PARTS LIST FOR ENGINE, ASSEMBLY W/ACCESSORIES (2815-980-7092) (MACK 11GBA12006P1), (2815-087-2273) (MACK 11GBA12006AP1) AND (2815-045-6865) (MACK 11GBA12006BP1) (MACK MODELS ENDT-673) AND CLUTCH (ROCKFORD MODEL 15TM)

END ITEM APPLICATION:

TRUCK, TRACTOR: 5-ton, 6 x 6, M52A1, w/e	2320-086-7479
TRUCK, TRACTOR: 5-ton, 6 x 6, M52A1, w/wn, we	2320-086-7480
TRUCK, CARGO: 5-ton, 6 x 6, M54A1, w/e	2320-086-7481
TRUCK, CARGO: 5-ton, 6 x 6, M54A1, w/wn, we	2320-086-7482

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TECHNICAL MANUAL
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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *25 September 1968*

DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

ENGINE, ASSEMBLY W/ACCESSORIES MACK MODEL ENDT-673

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*This manual supersedes TM 9-2815-207-35, 19 July 1963 and TM 9-2815-207-35P, 23 May 1963.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual contains instructions for direct, general support and depot maintenance of the Mack diesel engine model ENDT-673 and the Rockford clutch model 15TM. These instructions furnish information for maintenance of the engine and clutch which is beyond the scope of tools, equipment, or parts normally available to using organizations. The instructions provide descriptions of and procedures for disassembly, inspection, repair, rebuild assembly, and test of engine and clutch.

b. Appendix A contains a list of current references, forms, technical manuals, and other available publications applicable to the Mack diesel engine and accessories model ENDT-673 and Rockford clutch model 15TM.

c. Any errors or omissions in this manual will be brought to the attention of the Commanding General, U.S. Army Tank-Automotive Command, Tech Data, Cataloging and Standarization Directorate, Warren, Michigan 48090, ATTN: AMSTA-TP, using DA Form 2028.

d. This technical manual differs from TM 9-2815-207-35 dated 19 July 1963, as follows:

(1) Adds information on later production engine.

(2) Revises information on the fuel injection system.

(3) Deletes information on the turbocharger.

Note. For turbocharger information see TM 9-2990-201-45.

(4) Adds information on the air compressor.

(5) Adds information on the power steering pump.

e. LO 9-2320-211-12 contains lubricating instructions for the engine, accessories, and clutch.

f. TM 9-2320-211-10 contains operating instructions for the engine, accessories, and clutch, as well as all maintenance operations allocated to operators in performing maintenance work within their scope.

g. TM 9-2320-211-20 contains instructions for the maintenance of the engine, accessories, and clutch, within the scope of organizational maintenance.

h. TM 9-2920-214-35 contains service and parts information on the Delco generator.

i. TM 9-2920-247-34 contains service and parts information for the Prestolite generator.

j. TM 9-2920-242-35 contains service information on the Delco Remy starter.

k. TM 9-2920-243-35 contains service and parts information on the Leece-Neville starter.

l. TM 9-2920-248-35 contains service and parts information on the Prestolite starter.

m. TM 9-2990-201-45 contains maintenance instructions and repair parts information on the turbocharger.

1-2. Direct Support, General Support, and Depot Maintenance Allocation

Refer to the maintenance allocation chart in TM 9-2320-211-20.

1–3. Forms, Records, and Reports

a. *General.* Responsibility for the proper execution of forms, records, and reports rests upon the officers of the units maintaining this equipment. Records, reports, and authorized forms are normally used to indicate the type, quantity, and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops, and for delivery of materiel requiring further repair to ordnance shops. The forms, records, and reports establish the work required, the progress of work within the shops, and the status of the materiel upon completion of its repair.

b. *Authorized Forms.* The forms generally applicable to units maintaining this equipment are listed in the appendix. No forms other than those approved for the Department of the Army will be used. Pending availability of forms listed, old forms may be used. For current and complete listing of all forms, refer to current DA PAM 310–2. Additional forms applicable to using personnel are listed in the operation technical manual. For instructions on use of these forms, refer to TM 38–750.

c. *Field Report of Accidents.* The reports necessary to comply with requirements of the Army Safety program are prescribed in detail in SR 385–10–40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

d. *Report of Unsatisfactory Equipment, Materiel, or Publications.* Any suggestions for improvement in design and maintenance of equipment and spare parts, safety, efficiency of operation, or pertaining to the application of prescribed petroleum fuels, lubricants, and/or preserving material, or technical inaccuracies noted in Department of the Army Publications, will be reported through technical channels as prescribed in TM 38–750.

Note. Do not report all failures that occur. Report only repeated or recurrent failures or malfunctions which indicate unsatisfactory design or material. However, reports will always be made when exceptionally costly equipment is involved.

Section II. DESCRIPTION AND DATA

1–4. Localization of Engine Components

a. The terminology defined in b through e below will be used to identify the location of parts and assemblies.

b. The front end of the engine is the end where the cooling fan and vibration damper are mounted, and the rear end is the flywheel end.

c. As viewed from the rear end of the engine toward the front, the side to the viewer's right is called the engine right side. The side to the viewer's left is called the engine left side.

d. Cylinders, pistons, connecting rods, and connecting rod bearings are numbered one through six, going from front to rear of engine.

e. Main bearings, main bearing caps, crankshaft main bearing journals and camshaft journals and bearings are numbered one through seven, going from front to rear of engine.

1–5. Description

a. *General.* The Mack model ENDT–673 diesel engine assembly is an in-line, six-cylinder engine of the four-stroke cycle, open combustion chamber, dual-head design. Both the block and the heads are cast of chrome-nickel alloy iron. Each head serves three cylinders and includes an overhead exhaust valve and intake valve with their operating mechanisms for each cylinder. The two cylinder heads are identical and interchangeable. An exhaust-gas-pressure-operated turbocharger aids engine breathing for greater efficiency. The engine is a liquid-cooled, internal combustion engine of the compression-ignition type, having a nominal compression ratio of 16.59 to 1. Removable dry-type cylinder sleeves are cast from a special-alloy iron and hardened for longer life. Both crankshaft and camshaft are seven-journal drop-forgings. The engine assembly includes a single-plate, dry-disk type Rockford clutch model 15TM, as well as an air compressor to operate vehicle brakes, and a hydraulic pump for power steering of the vehicle. The engine systems are described below.

b. *Special.* Three different models of the Mack model ENDT 673 engines are covered in this publication. Differences are as follows:

(1) *Engine FSN 2815–980–7092.* This engine contains five ring pistons, has 9/16-inch cylinder head studs, and has metal bearings in the injection pump governor.

(2) *Engine FSN 2815–087–2273.* This engine contains four ring pistons, has 5/8-inch cylinder head studs, and has a teflon bushed injection pump governor.

(3) *Engine FSN 2815–045–6865.* Similar to others; has improved cylinder head and crankshaft main bearings.

1–6. Fuel Injection System (fig 1–5)

The fuel transfer pump assembly, located on the fuel injector pump, draws fuel from the supply tank through a primary filter mounted on the vehicle, and delivers it through a secondary filter to the injector pump, at low pressure. The fuel injector pump is a single plunger per cylinder, constant stroke, sleeve-control type. It is driven by a separate, matched set

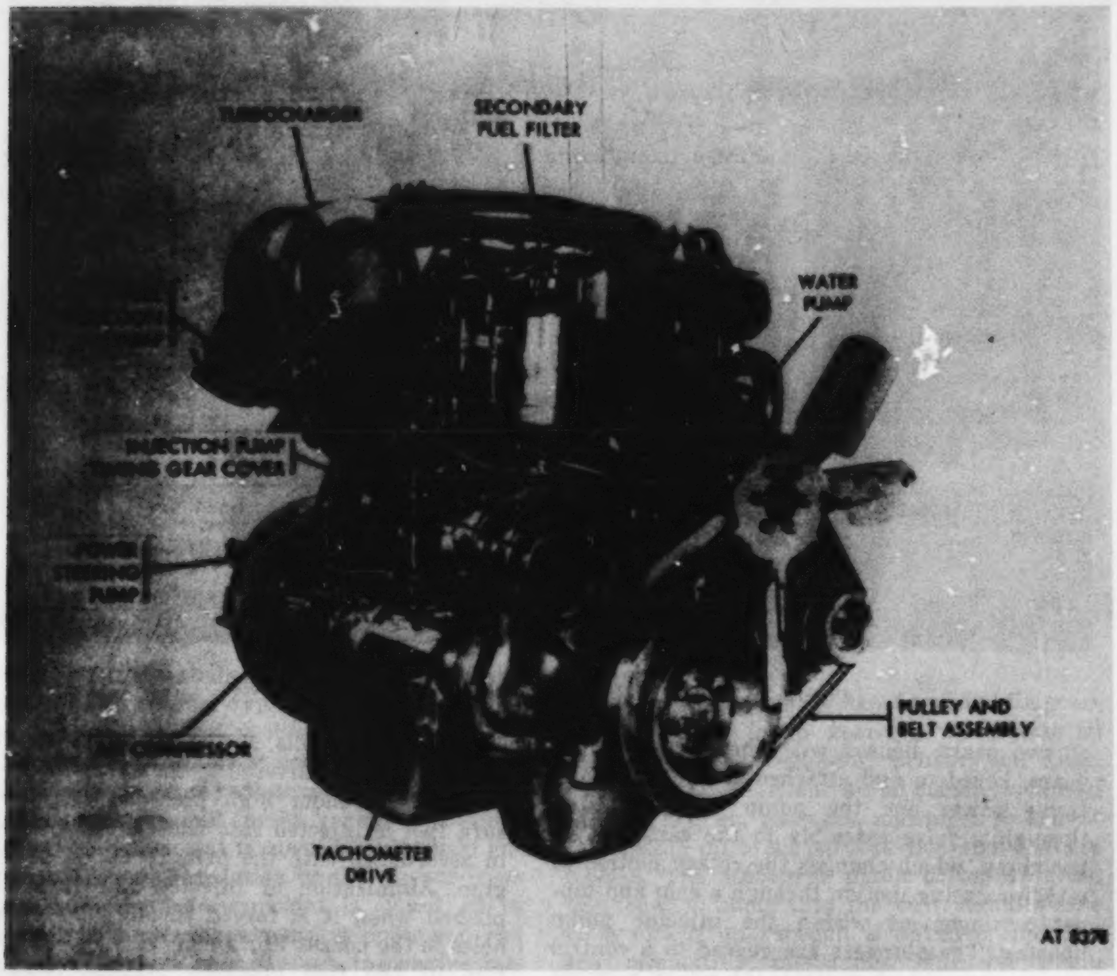

TURBOCHARGER
SECONDARY FUEL FILTER
WATER PUMP
INJECTION PUMP TIMING GEAR COVER
POWER STEERING PUMP
PULLEY AND BELT ASSEMBLY
AIR COMPRESSOR
TACHOMETER DRIVE
AT 8378

Figure 1–1. Model ENDT–673 diesel engine assembly—right front view.

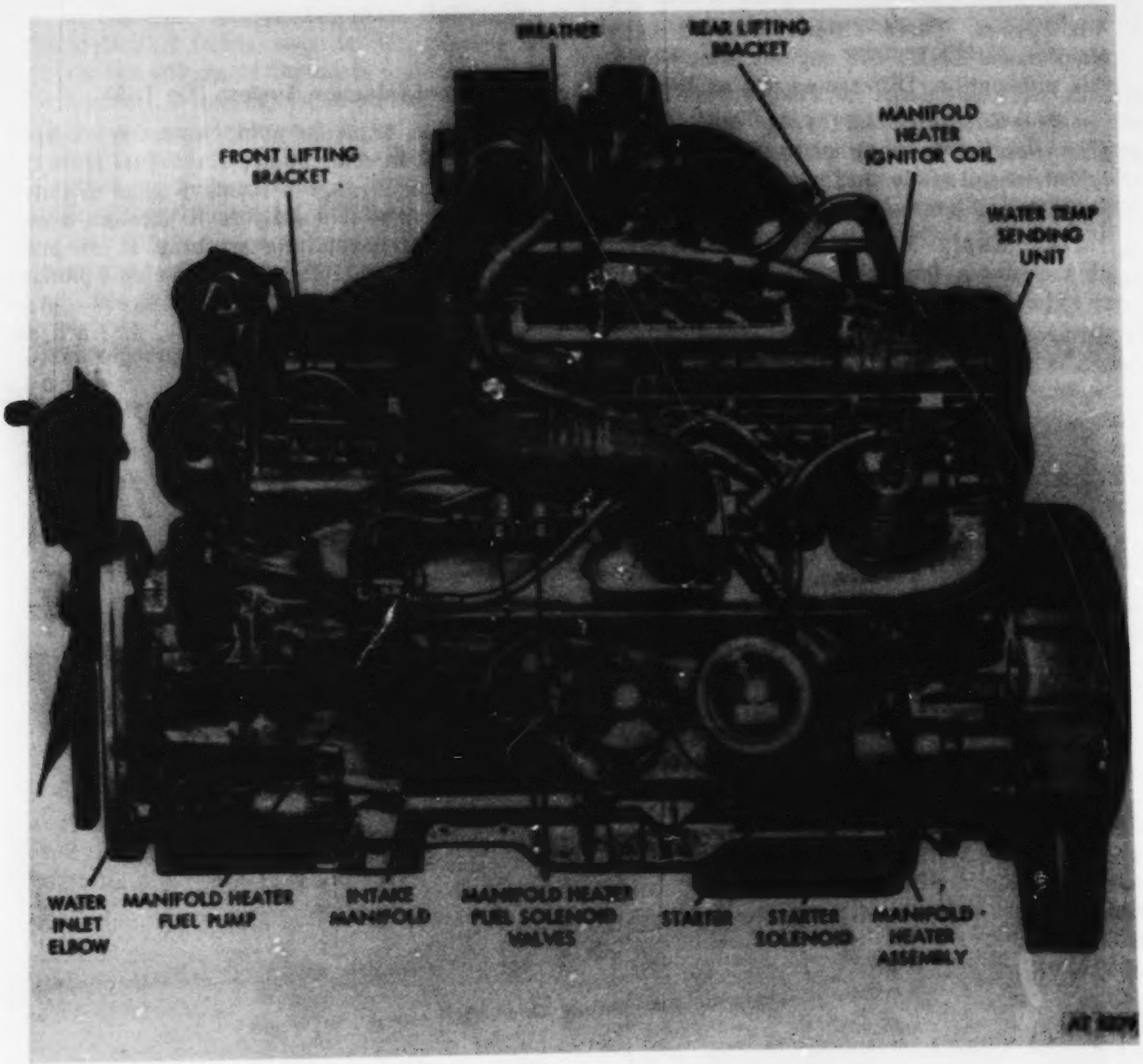

BREATHER
REAR LIFTING BRACKET
FRONT LIFTING BRACKET
MANIFOLD HEATER IGNITOR COIL
WATER TEMP SENDING UNIT
WATER INLET ELBOW
MANIFOLD HEATER FUEL PUMP
INTAKE MANIFOLD
MANIFOLD HEATER FUEL SOLENOID VALVES
STARTER
STARTER SOLENOID
MANIFOLD HEATER ASSEMBLY

Figure 1-2. Model ENDT-673 diesel engine assembly—top view.

of two gears, housed with the engine timing gears, keyed to and attached to the camshaft. Drive power for the pump is transmitted through a drive assembly to the camshaft of the pump, which changes the rotary motion to a reciprocating motion through a cam and tappet arrangement within the injector pump housing. The plungers are geared to a control rod, or rack, which controls the rotary position of all the plungers and the helical cut in their lower portion. This accurately measures the amount of fuel delivered to the spray nozzle in the cylinder under high pressure. High-pressure fuel is injected into the engine cylinders in accordance with the firing order of the engine. Atomization of injected fuel is accomplished when it is forced through four small holes in the nozzle. For a more detailed description of the fuel injection system, refer to Chapter 7.

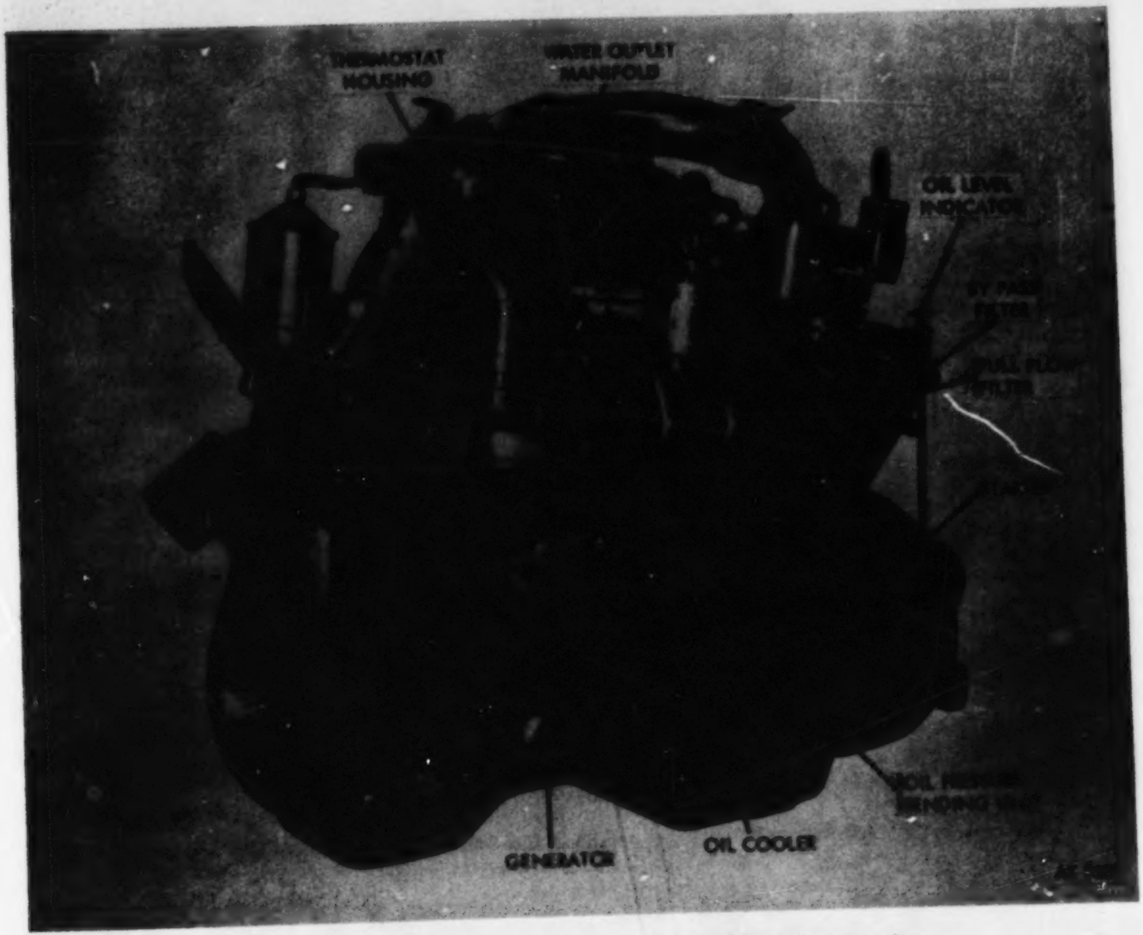

THERMOSTAT HOUSING
WATER OUTLET MANIFOLD
OIL LEVEL INDICATOR
BY PASS FILTER
FULL FLOW FILTER
OIL PRESSURE SENDING UNIT
GENERATOR
OIL COOLER

Figure 1-5. Model ENDT-673 diesel engine assembly—left front view.

1-7. Cooling System (fig 1-6)

The cooling system includes a pulley-driven, centrifugal, impeller-type water pump, a bypass-type thermostat, a five-blade fan, and an oil cooler. The system is completed and closed by connection to a radiator, when the engine assembly is installed in the vehicle it powers. When the thermostat is open, as in normal engine operation, circulation of the coolant is as shown. When the thermostat is closed, as in engine warmup, the bypass is open and the coolant circulates only through the engine cylinder block, cylinder heads, water manifolds, oil cooler, and pump.

1-8. Lubricating Oil System (figs 1-7 through 1-9)

The lubricating oil system consists of a gear-type scavenger pump, gear-type circulating oil pump, pressure regulator, primary oil filter, secondary oil filter, and an oil cooler, with necessary galleries, passages, and pipes to deliver lubricating oil to all parts of the engine where needed. The scavenger pump moves oil from the forward sump into the rear sump, where it is picked up through a screened inlet, by the circulating oil pump. The oil pump mounted on the No. 1 main bearing cap is driven by the crankshaft through meshed

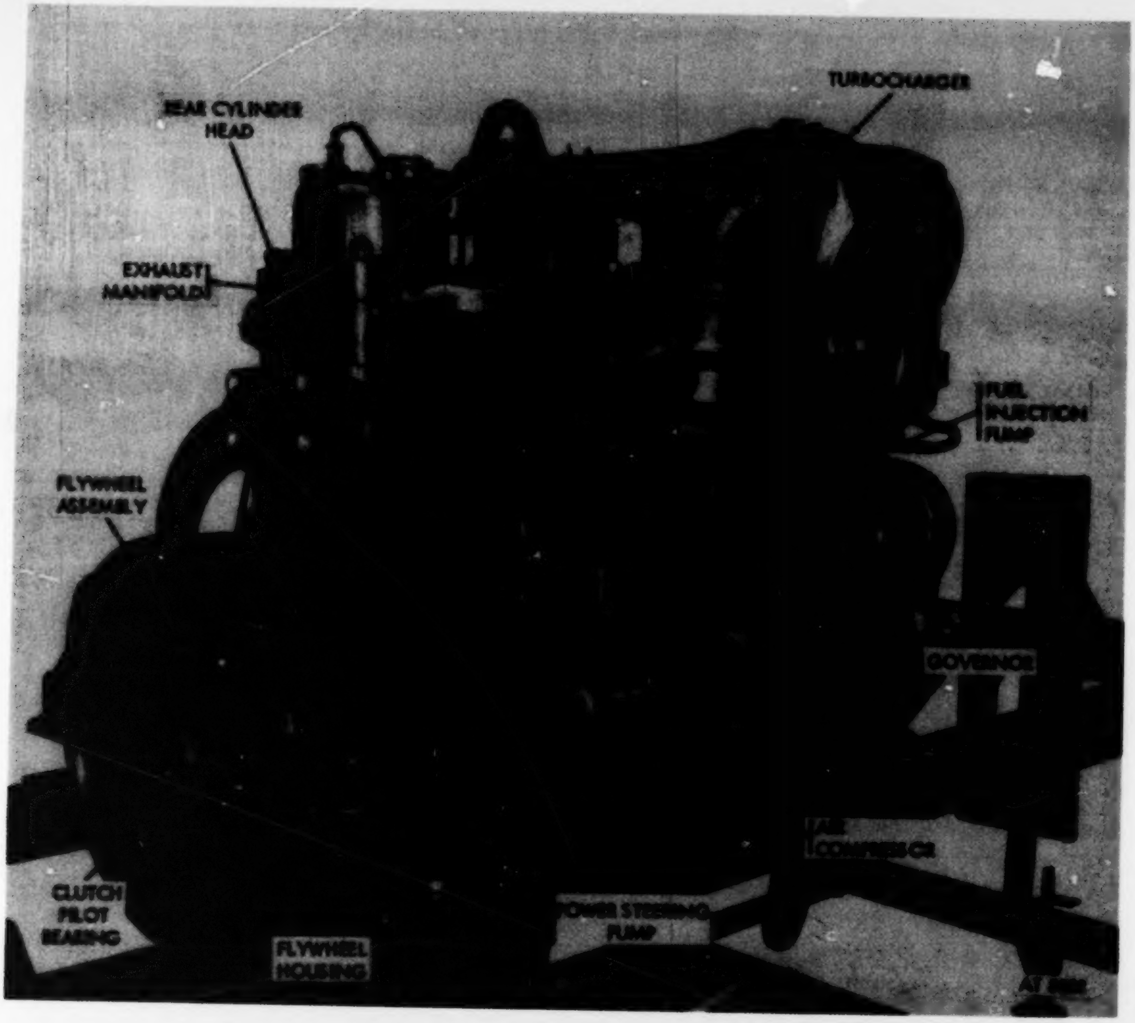

TURBOCHARGER
REAR CYLINDER HEAD
EXHAUST MANIFOLD
FUEL INJECTION PUMP
FLYWHEEL ASSEMBLY
GOVERNOR
AIR COMPRESSOR
CLUTCH PILOT BEARING
POWER STEERING PUMP
FLYWHEEL HOUSING

Figure 1-4. Model ENDT-673 diesel engine assembly—right rear view.

gears. The circulating oil pump delivers oil through the relief valve, the pressure regulator, the full-flow oil filter, and the oil cooler, back to the pressure regulator pad where it is distributed to the main oil gallery, the oil pressure sending unit, and the turbocharger. A portion of oil after passing through the full-flow filter is also passed through the bypass filter and returned directly to the crankcase. Also, oil under pump pressure is delivered directly to the auxiliary shaft housing. The turbocharger is fed directly from the pressure regulator pad through an external line. The oil travels from the main gallery to the main bearing journals of the crankshaft, where part of the oil is delivered to the connecting rod bearing journals, through drilled passages in the crankshaft; from the connecting rod bearings the pressurized oil travels through the drilled passage in the rod to the piston pin and its bearing. The remaining oil from the main bearings is delivered to the camshaft bearings through a drilled passage in the engine block. From the camshaft, oil is distributed to both cylinder heads, their valve-operating mechanisms and the push rods, the air compressor,

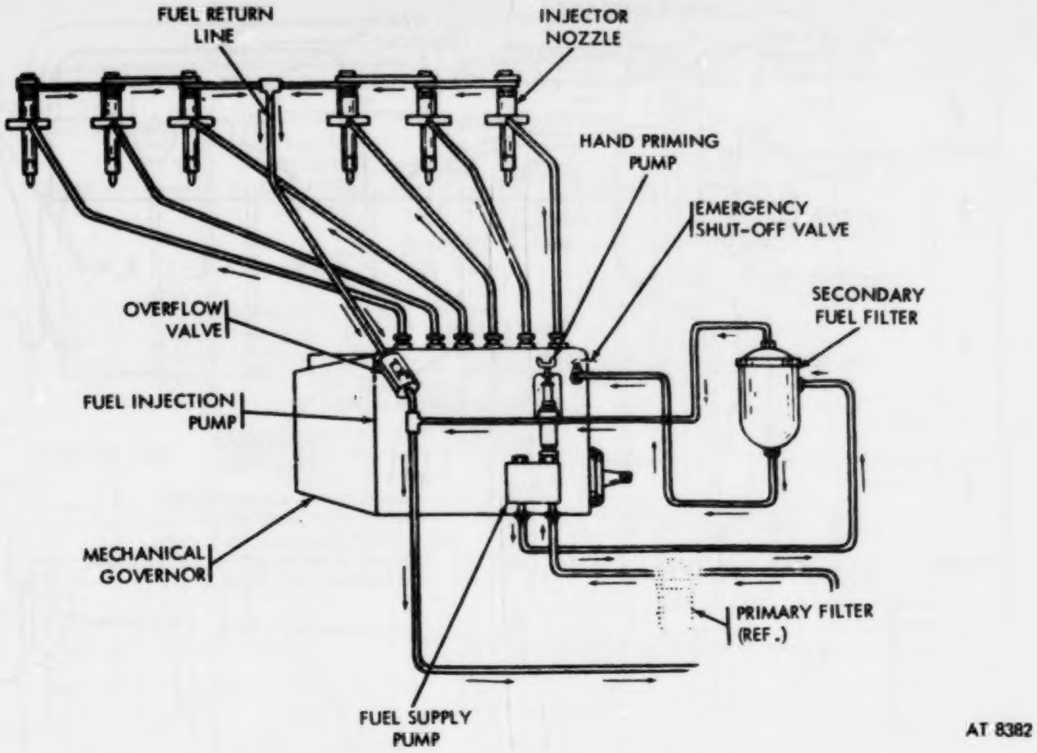

FUEL RETURN LINE
INJECTOR NOZZLE
HAND PRIMING PUMP
EMERGENCY SHUT-OFF VALVE
SECONDARY FUEL FILTER
OVERFLOW VALVE
FUEL INJECTION PUMP
MECHANICAL GOVERNOR
PRIMARY FILTER (REF.)
FUEL SUPPLY PUMP
AT 8382

Figure 1-5. Engine fuel system—schematic diagram.

and the auxiliary shaft front bearings. Through the auxiliary shaft housing, a portion of oil is delivered through the auxiliary shaft to the air compressor and power steering pump. A drilled passage in block carries the oil to an external line which supplies lubricating oil to the fuel injector pump. Oil returns to the crankcase sump through two return lines from the pressure regulation, the pressure regulator relief valve bypass, return passages through the heads and block, injector pump overflow, and the turbocharger return.

1-9. Air System

Filtered air enters the air intake of the turbocharger which delivers it, at slightly increased pressure and temperature, to the air intake manifold of the engine. The turbocharger is warmed and driven by exhaust gas pressure from the engine exhaust manifold.

1-10. Exhaust System

The engine includes a three-piece exhaust manifold, each serving two cylinders of the engine. The center piece includes a flange to which the turbocharger and turbocharger exhaust outlet elbow are mounted. The elbow is designed to accommodate a four-inch exhaust and muffler system to carry away exhaust gases and create a desirable amount of back pressure.

1-11. Electrical Starting System

The engine includes a 24-volt electrical starting motor and a 24-volt, 25-ampere generator which is belt-driven from the pulley mounted on the front of the engine crankshaft.

1-12. Clutch

The engine assembly includes a 15-inch

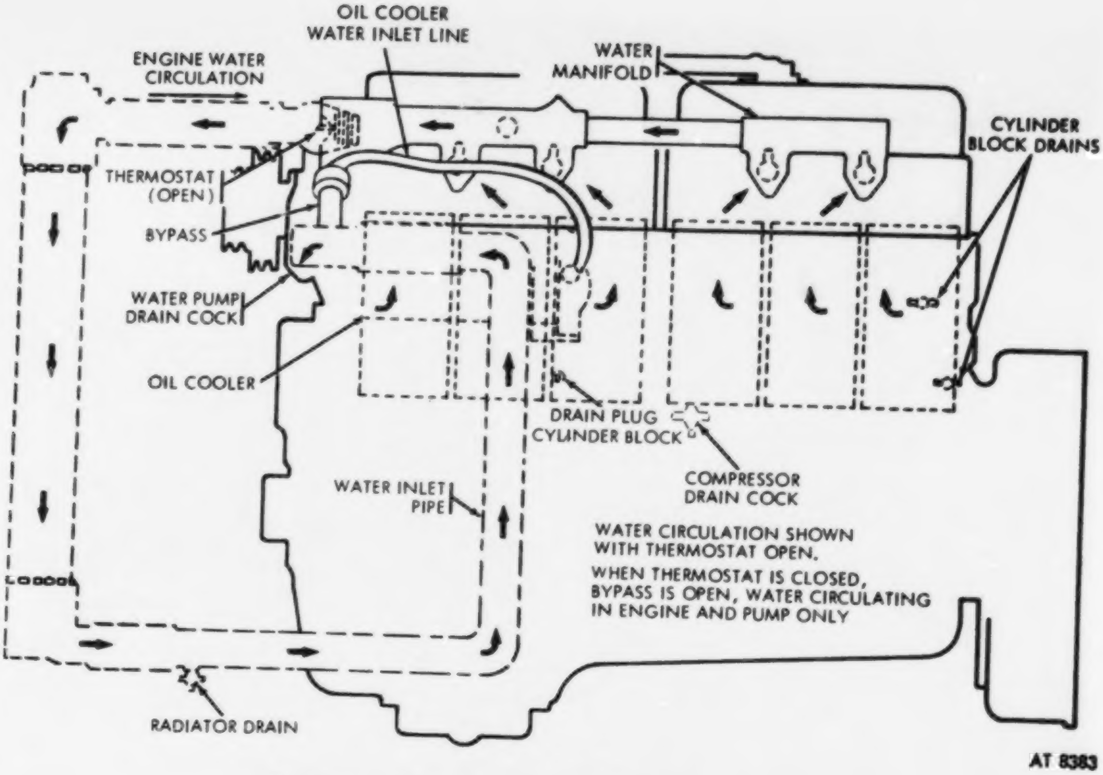

OIL COOLER WATER INLET LINE
ENGINE WATER CIRCULATION
WATER MANIFOLD
CYLINDER BLOCK DRAINS
THERMOSTAT (OPEN)
BYPASS
WATER PUMP DRAIN COCK
OIL COOLER
DRAIN PLUG CYLINDER BLOCK
COMPRESSOR DRAIN COCK
WATER INLET PIPE
WATER CIRCULATION SHOWN WITH THERMOSTAT OPEN.
WHEN THERMOSTAT IS CLOSED, BYPASS IS OPEN, WATER CIRCULATING IN ENGINE AND PUMP ONLY
RADIATOR DRAIN
AT 8383

Figure 1-6. Engine cooling system—schematic diagram.

single, dry-plate type Rockford clutch model 15TM: it provides a total spring pressure of 4,095 pounds through its 21 springs, giving a torque capacity of 1,550 pounds-foot. The clutch assembly is attached to the engine flywheel by 12 capscrews. The clutch operating pedal and release bearing are a part of the vehicle transmission assembly.

1-13. Cold-Weather Starting Aid

The heater installation for the air intake manifold of the engine consists of an electric fuel pump, two solenoid shutoff valves, a fuel nozzle, an ignition unit, and spark plug. When the circuit to the heater installation is energized, the fuel pump is activated, the shutoff valves are opened, and the spark plug is energized by the ignition unit. Vaporized fuel sprays from the nozzle, is ignited by the spark plug, and burns in the intake heater housing, heating the air in the intake manifold before it enters the engine combustion chambers. The heater will operate on all fuels specified for the engine, so fuel is drawn directly from the engine supply. The two solenoid shutoff valves are identical and interchangeable. They are opened whenever the heater and pump are activated to assure that fuel is delivered only when the circuit is energized.

Caution: **The engine intake air heater system must not be operated unless the engine is cranking or operating. Failure to observe this will result in a flameout as the oxygen is used leaving fuel to run into the cylinders. This may cause a hydrostatic lock.**

1-14. Cylinder Block

The cylinder block is a one-piece casting of chrome-nickel alloy, with seven forged chrome-nickel alloy main bearing caps. The main bearing caps function as an integral part of the cylinder block. Cylinder walls are bored to re-

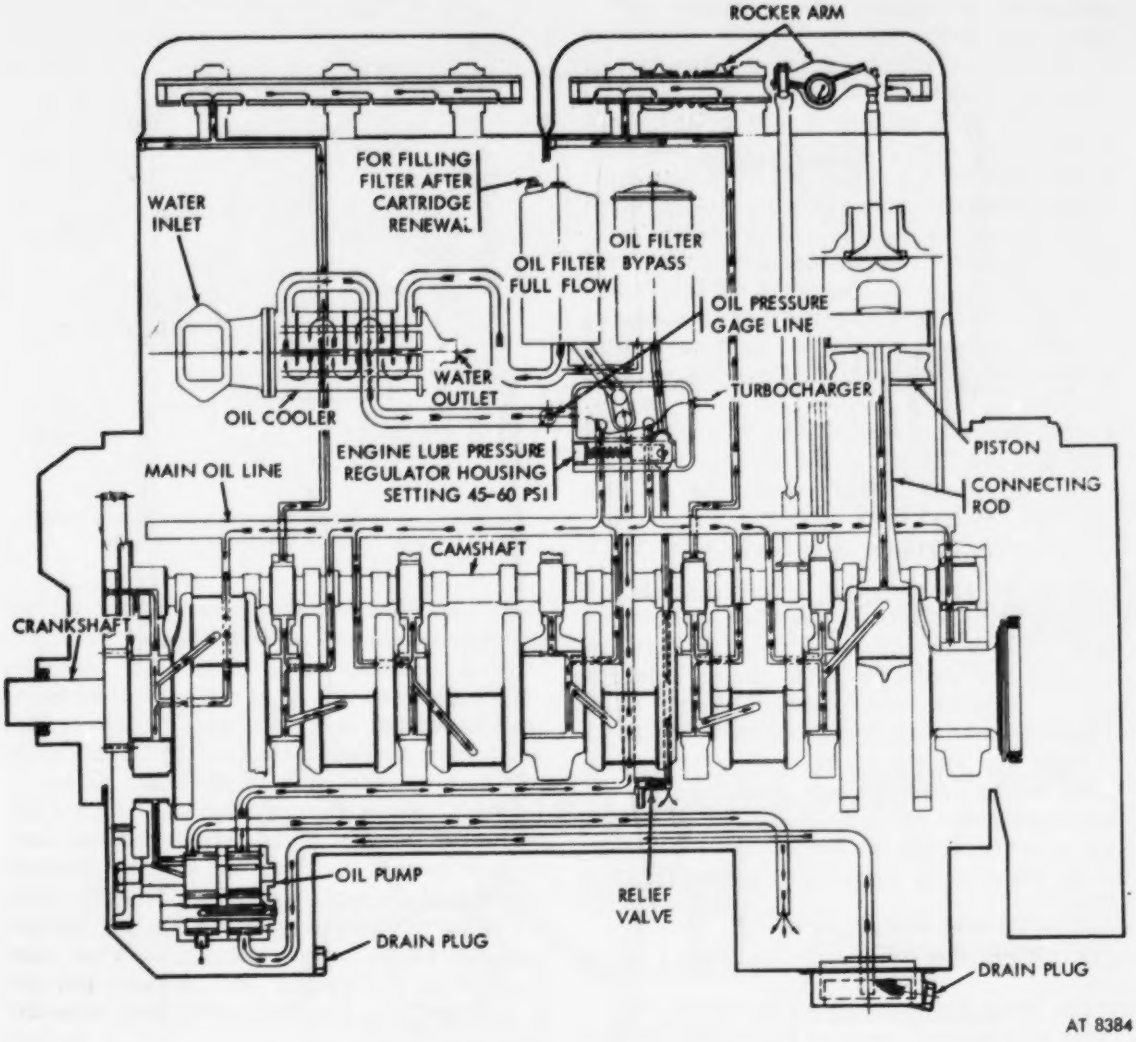

ROCKER ARM
FOR FILLING FILTER AFTER CARTRIDGE RENEWAL
WATER INLET
OIL FILTER FULL FLOW
OIL FILTER BYPASS
OIL PRESSURE GAGE LINE
WATER OUTLET
TURBOCHARGER
OIL COOLER
PISTON
ENGINE LUBE PRESSURE REGULATOR HOUSING SETTING 45-60 PSI
MAIN OIL LINE
CONNECTING ROD
CAMSHAFT
CRANKSHAFT
OIL PUMP
RELIEF VALVE
DRAIN PLUG
DRAIN PLUG
AT 8384

Figure 1-7. Engine lubricating oil pressure system diagram—cutaway side view.

ceive removable, dry-type cylinder sleeves of special alloy, hardened iron. All oil passages are rifle-bored. The SAE No. 1 flywheel housing is a separate unit, attached to the cylinder block with eight capscrews. The cylinder block is line-bored to receive seven camshaft bearings.

1-15. Main Bearings

The seven replaceable, precision-type main bearings are steelbacked, coper lead bearings with babbitt overlay. Main bearing caps are numbered and are not interchangeable.

1-16. Crankshaft, Flywheel, and Vibration Damper

The crankshaft is a drop-forged, medium carbon steel with hardened journals for both main and connecting rod bearings, polished fillets, and integral counterweights. It includes seven main and six connecting rod journals. The connecting rod journals are hol-

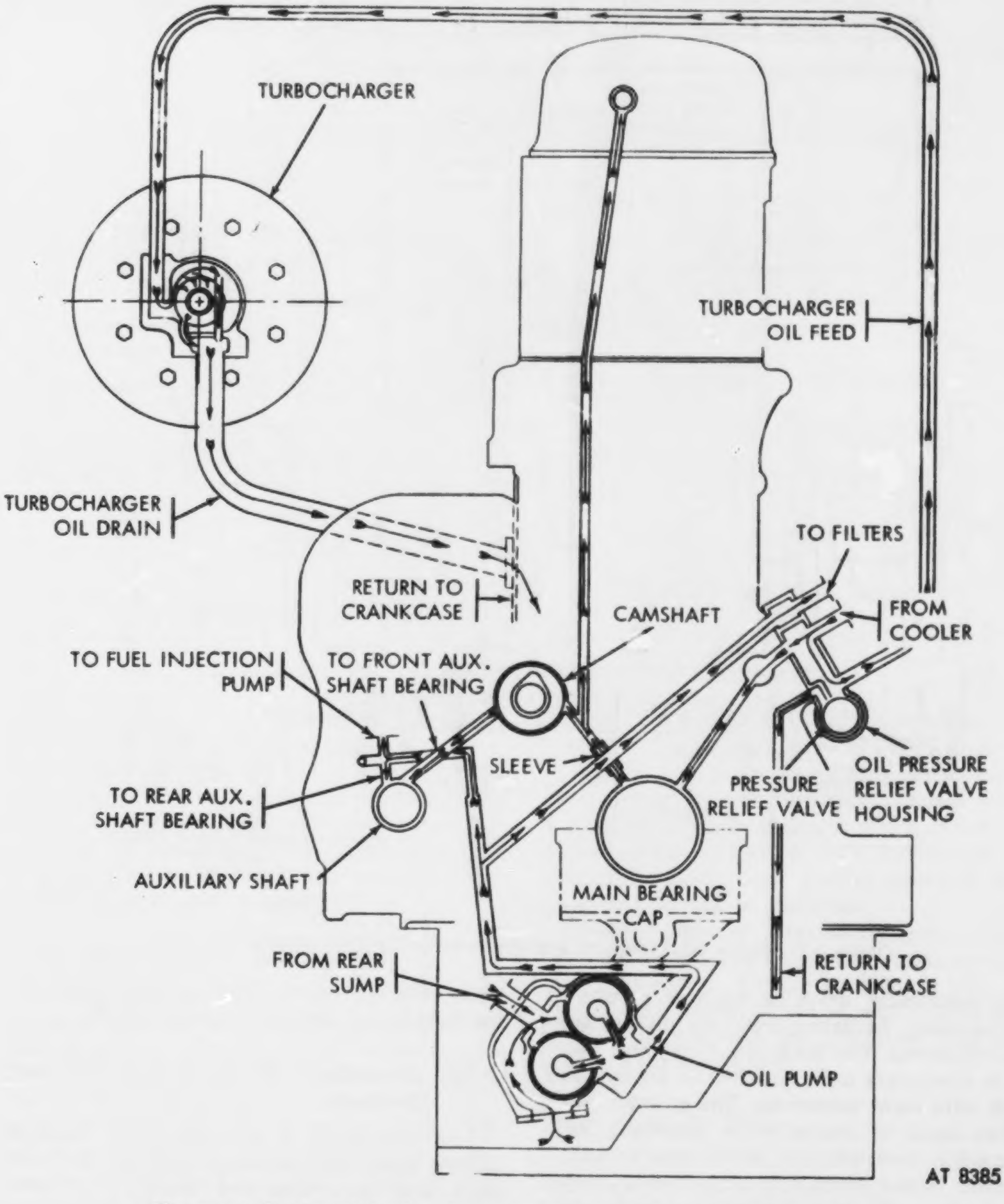

TURBOCHARGER
TURBOCHARGER OIL FEED
TURBOCHARGER OIL DRAIN
TO FILTERS
RETURN TO CRANKCASE
CAMSHAFT
FROM COOLER
TO FUEL INJECTION PUMP
TO FRONT AUX. SHAFT BEARING
SLEEVE
OIL PRESSURE RELIEF VALVE HOUSING
PRESSURE RELIEF VALVE
TO REAR AUX. SHAFT BEARING
AUXILIARY SHAFT
MAIN BEARING CAP
FROM REAR SUMP
RETURN TO CRANKCASE
OIL PUMP
AT 8385

Figure 1–8. Engine lubricating oil pressure system diagram—cutaway front view.

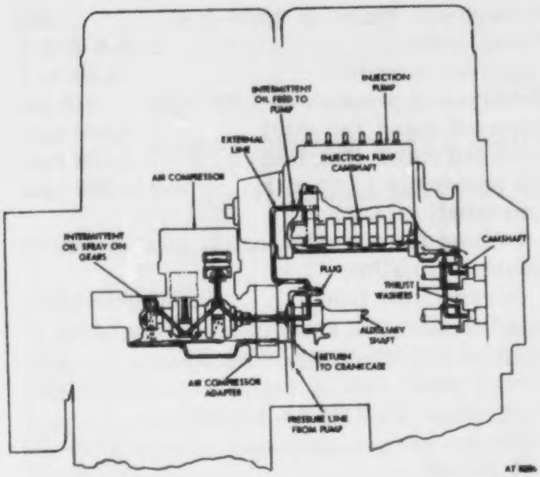


Figure 1-9. Engine lubricating oil pressure system diagram—accessory cutaway view.

low for better heat dissipation and cooler running. An integral flange on the crankshaft provides for mounting a flywheel. A hub keyed to the front end of the crankshaft carries a viscous-type vibration damper which tunes critical crankshaft vibrations out of the operating range of the engine to protect the crankshaft against crystallization, fatigue, and failure. Holes are drilled diagonally through each main bearing journal, crank cheek, and connecting rod journal to provide a direct passage for pressurized lubricating oil from the main bearing journal to the connecting rod journal. The crankshaft thrust and end play are taken and adjusted at No. 4 journal.

1–17. Connecting Rods and Bearings

The connecting rods are drop-forged, I-beam, chrome-molybdenum steel. The caps are numbered and are not interchangeable. The replaceable precision connecting rod bearings are steel-backed copper lead bearings with babbitt overlay and locking tongues to assist in correct installation. A split bronze bushing is pressed into the piston pin end of the rod. An oil hole in the bushing alines with the oil passage in the rod to permit pressure lubrication.

1–18. Pistons, Piston Pins, and Rings

The pistons in the engine are tin-plated, aluminum alloy forgings which are cam-ground and tapered to provide an accurate fit in the cylinder at normal operating temperatures. Each piston in engines FSN 2815–980–7092 accommodates five piston rings. Four rings are above the piston pin boss and one is below it. The top three rings are compression rings and the bottom two are oil control rings. Each piston engines FSN 2815–087–2273 and 2815–045–6865 accommodates four rings, three compression and one oil control, all above the piston pin boss. In all engines the chrome-molybdenum steel piston pins are full-floating in both piston and connecting rod. A retainer ring is inserted into the piston pin boss at each end of the piston pin to prevent the pin from scoring the cylinder walls.

1–19. Cylinder Heads and Valves

The two cylinder heads are cast of chrome-nickel alloy and are identical, interchangeable, and individually replaceable units. Each head assembly serves three cylinders and includes three intake valves, three exhaust valves, inner and outer valve springs, rocker arms and shaft. The valve seats are shrunk into place in the cylinder head, and the valve guides are a press fit in the head. The valve-operating mechanism is secured to the head with six bolts. A cylinder head cover encloses the top of each head.

1–20. Camshaft

The camshaft is drop-forged steel, seven journal, supported by seven bushing-type bearings pressed into the cylinder block. The camshaft is driven by a helical gear, keyed to the shaft, which meshes with the crankshaft gear. Push rods, which ride the cams, operate the valve mechanism. End play of the camshaft is adjusted by a thrust button in the gear cover.

1–21. Auxiliary Drive Shaft

The auxiliary drive shaft is supported by two steel-backed babbitt, bushing-type bearings which are pressed into the cylinder block. The shaft, which includes an integral tachometer drive gear, is driven by a gear keyed to its front end, which meshes with the camshaft gear. The oil pump drive gear is used merely as a spacer in this engine, since the oil pump is driven by the crankshaft gear. The air compressor drive coupling is keyed to the shaft. Thrust is taken by a washer pinned to the cylinder block and a thrust button on the timing gear cover. End play is adjusted at the thrust button.

1–22. Injection Pump Drive Shaft

The injection pump drive shaft is supported on ball bearings and is driven by a matched set of gears, one of which is bolted to the outer face of the camshaft gear.

1–23. Lubricating Oil Pump

The lubricating oil pump is a positive displacement gear type and is crankshaft-driven through meshed gears. Pumping is accomplished by a drive gear and an idler gear rotating within machined pockets of the pump housing and carrying oil around the gears' outer diameters from suction to pressure sides of the assembly.

1–24. Data

Manufacturer	Mack Trucks, Inc.
Model	ENDT–673
Type	in-line, compression ignition, diesel, liquid-cooled, turbocharged, valve-in-head
Number of cylinders	6
Bore	4⅞ in.
Stroke	6 in.
Displacement, total	672 cu. in.
Horsepower, brake @ 2,100 rpm	205
Firing order	1–5–3–6–2–4
Compression ratio	16.59 to 1
Compression pressure @ 1,000 rpm	575 psi
Governed speed (no load)	2,200 rpm
Governed speed (full load)	2,100 rpm
Idle speed	550 to 575 rpm
Crankshaft rotation (viewed from front)	clockwise
Camshaft rotation (viewed from front)	counterclockwise
Injection pressure, opening	2,300 to 2,350 psi
Injection timing, port closing BTC	29°
Fuel oil grade	VV–F–800
Lubricating oil pressure, pounds:	
Idle	10 to 20
Maximum	45 to 75
Valves, intake:	
Number	6
Clearance:	
Hot idle	0.014 in.
Cold static	0.016 in.
Valves, exhaust:	
Number	6
Clearance:	
Hot idle	0.022 in.
Cold static	0.024 in.
Cooling:	
Type	forced circulation, pressure-type, thermostat, centrifugal impeller-type pump-belt driven, five-blade fan
Engine operating temperature (normal 60° F ambient)	180° to 200° F

CHAPTER 2

PARTS, SPECIAL TOOLS AND EQUIPMENT FOR DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

2–1. General

Tools and equipment and maintenance parts over and above those available to the using organization are supplied to direct and general support maintenance units and depot shops for maintaining, repairing, and/or rebuilding the materiel.

2–2. Parts

Direct and general support and depot maintenance parts for the Mack Diesel engine ENDT–673 are listed in Appendix B of this manual, which is the authority for requisitioning replacements.

2–3. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are listed in DA PAM 310–6, and are authorized for issue by TA and TOE.

2–4. Special Tools and Equipment

Certain tools and equipment illustrated in figures 2–1 through 2–9 are specially designed for direct, general and depot maintenance, repair, and general use with the materiel, and are listed in table 1 for information only. The special tools list to be used for requisitioning replacements is contained in Appendix B.

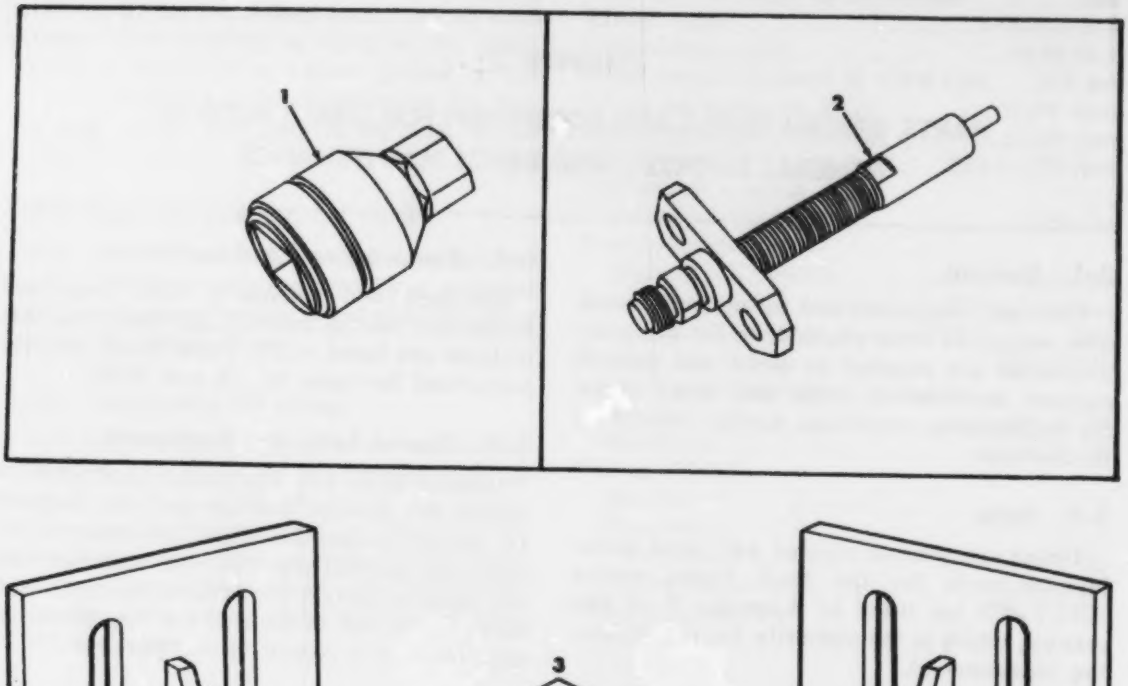
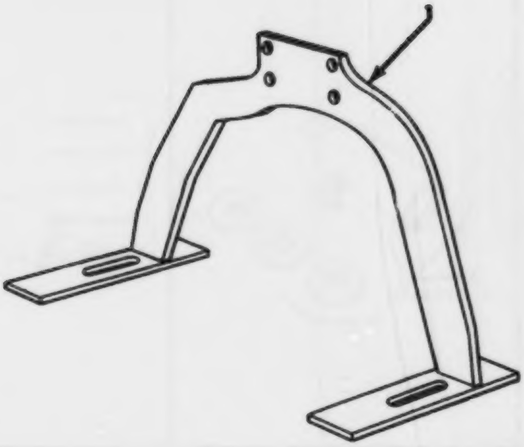
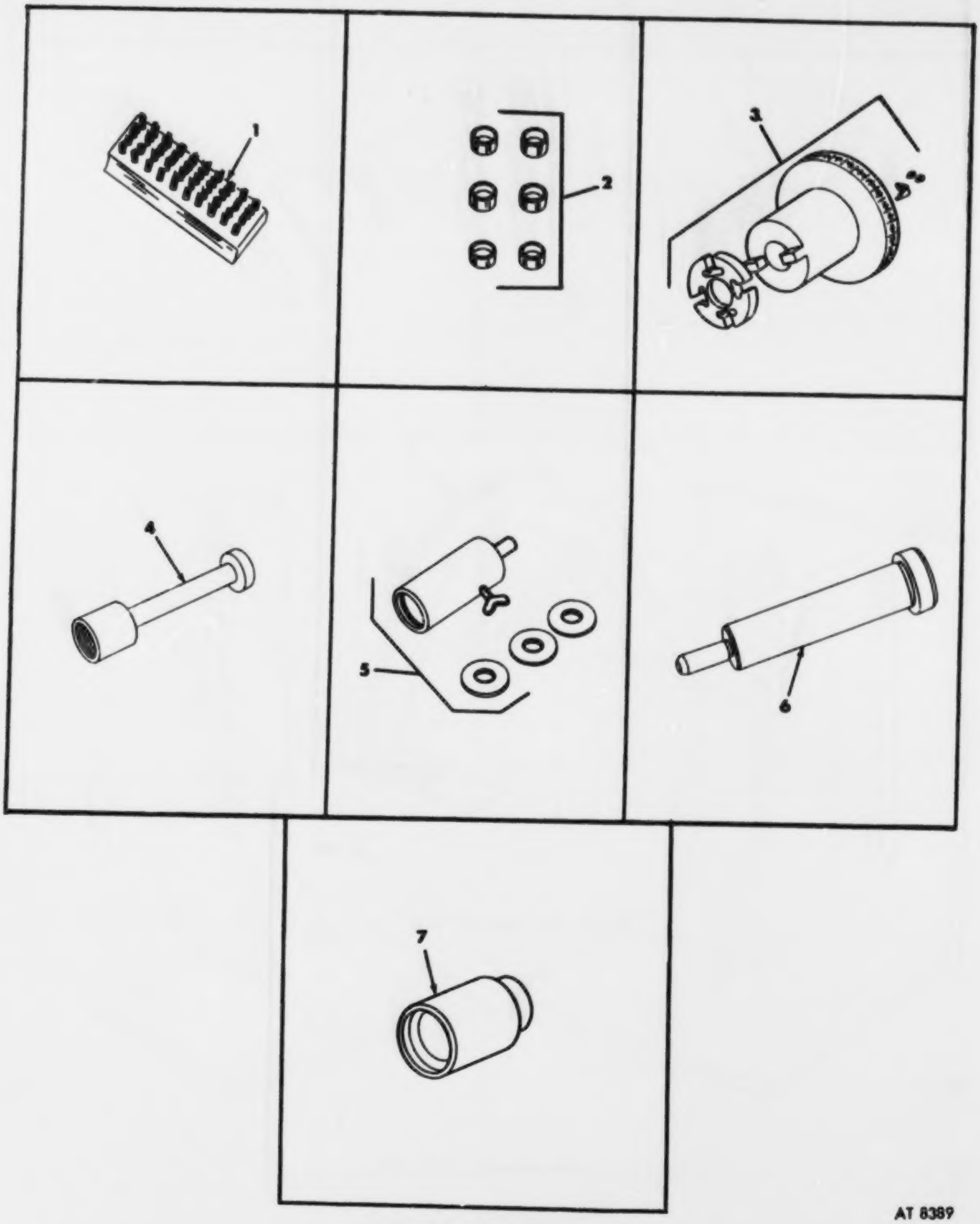


Figure 2–1. Special tools.



AT 8388

Figure 2-2. Special tools.



AT 8389

Figure 2-3. Special tools.

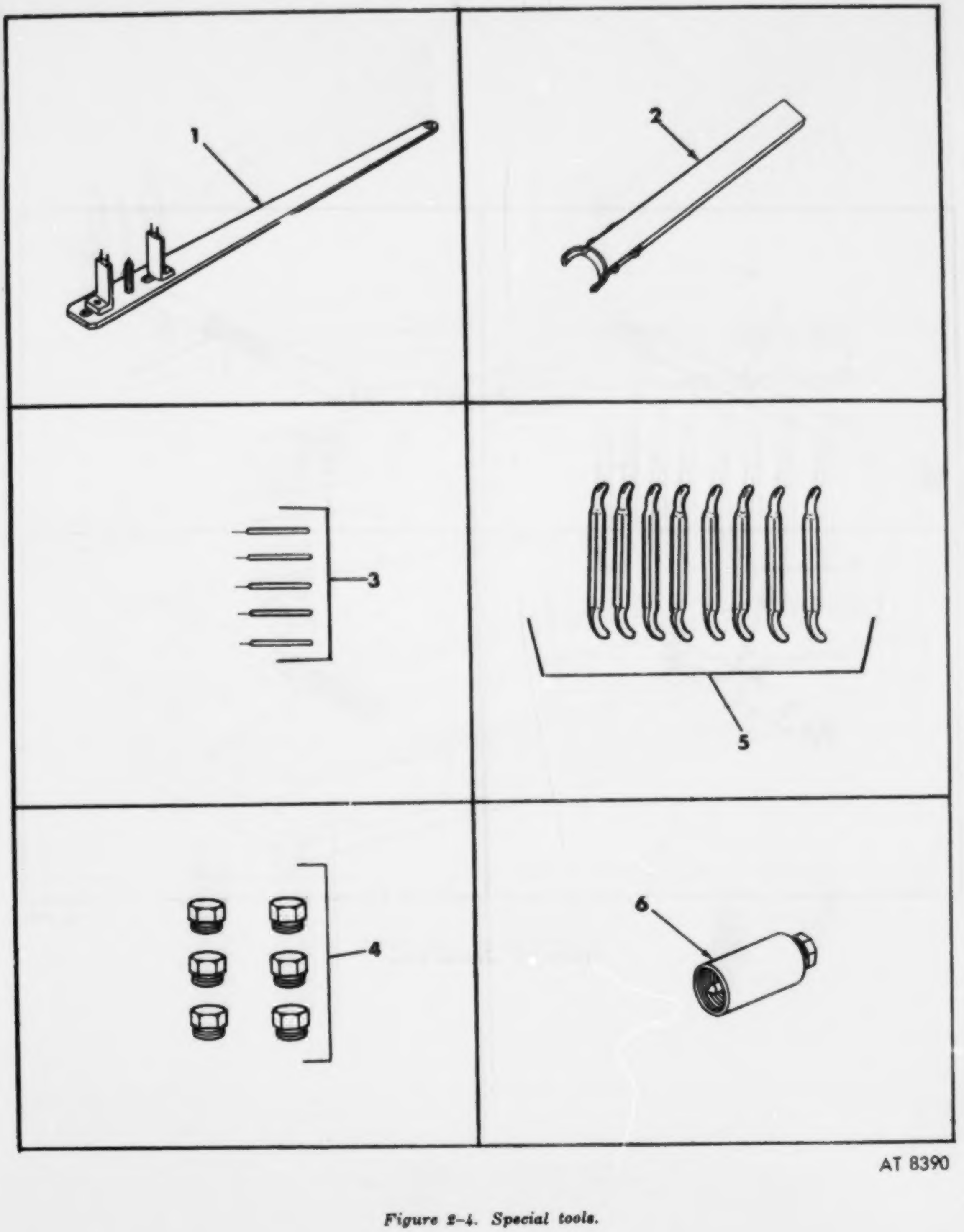


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Figure 2-4. Special tools.

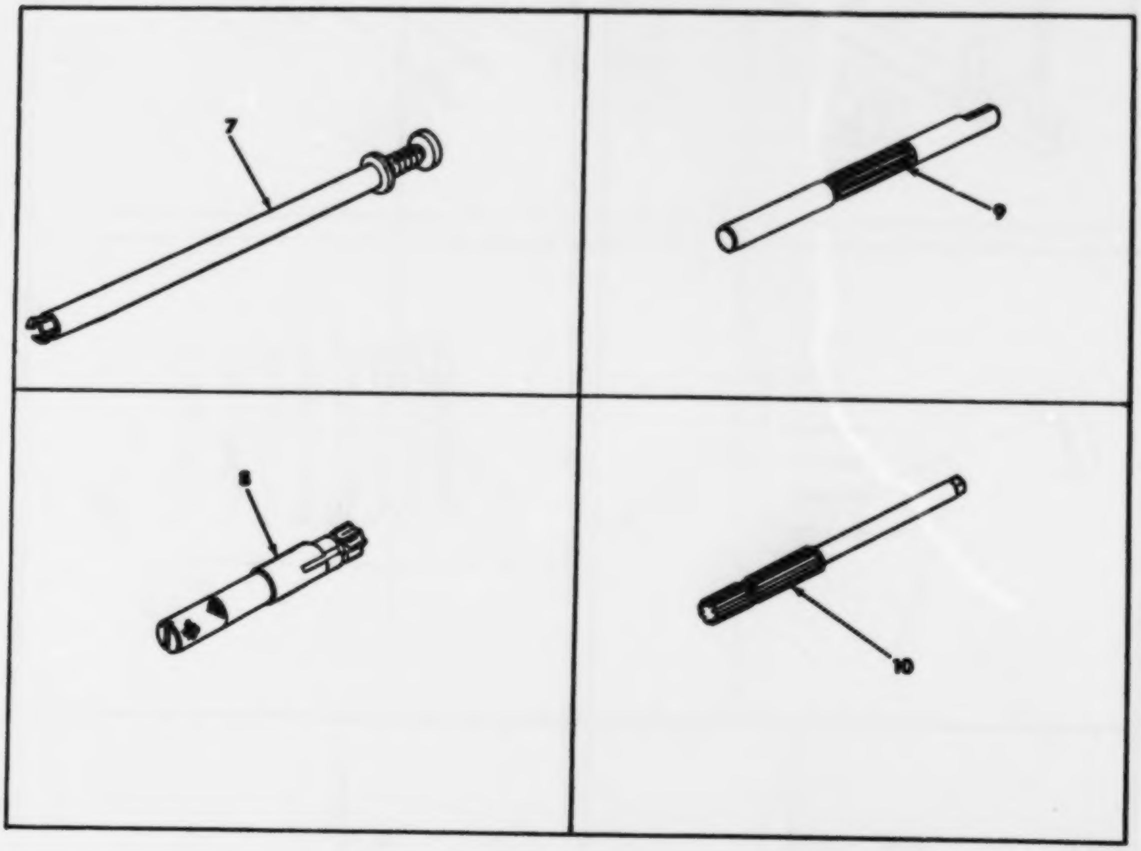
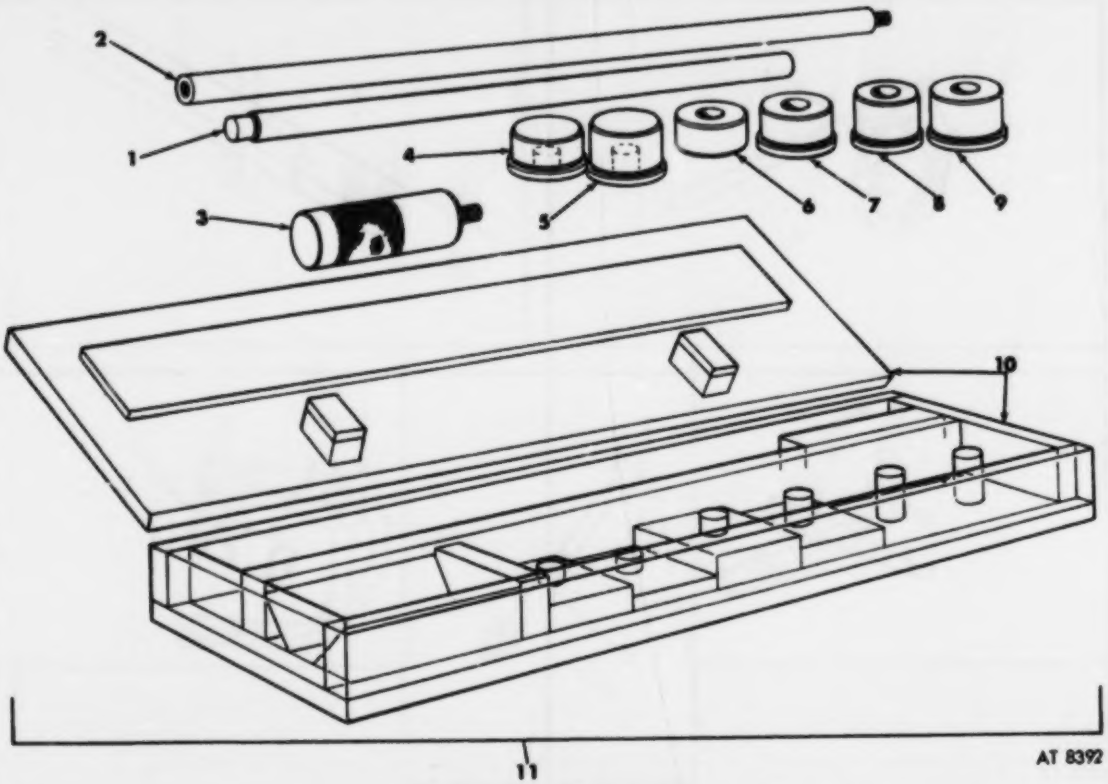

7
9
8
10
AT 8391

Figure 2–5. Special tools.


2
1
4
5
3
6
7
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9
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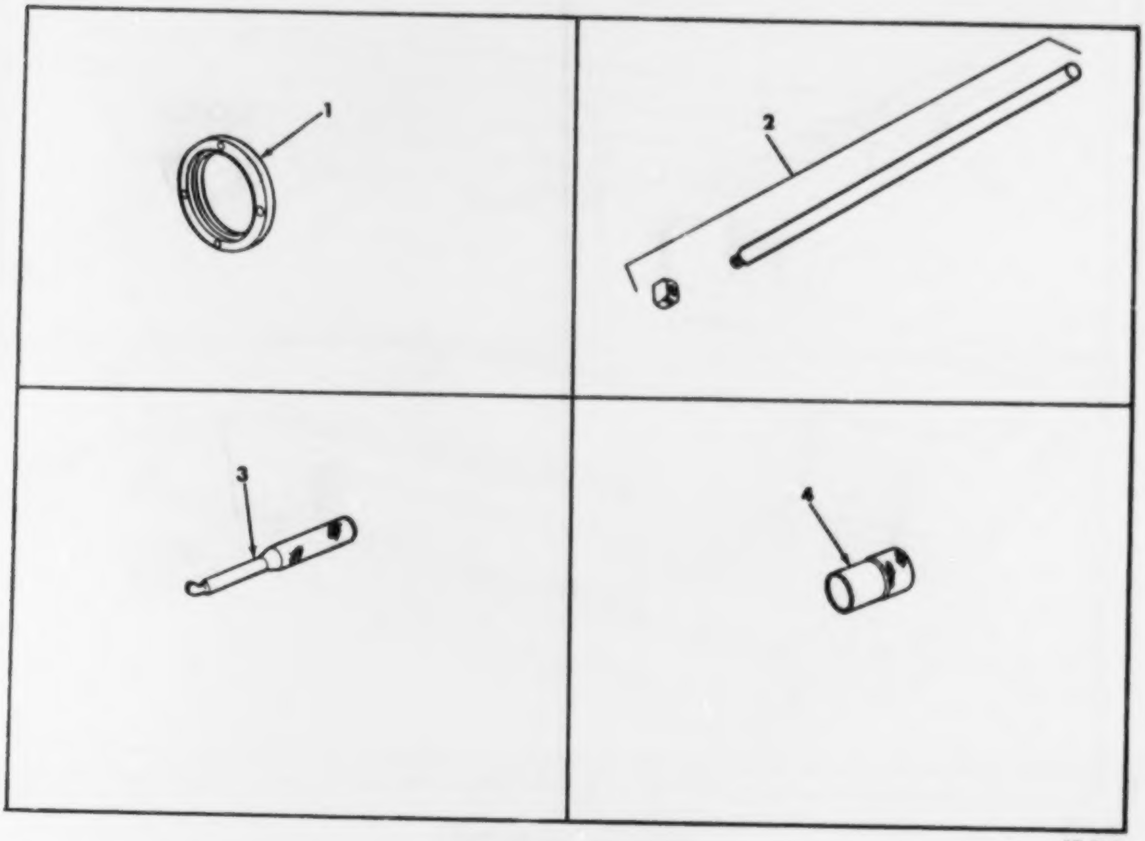
11
AT 8392

Figure 2-6. Special tools.



AT 8393

Figure 2-7. Special tools.

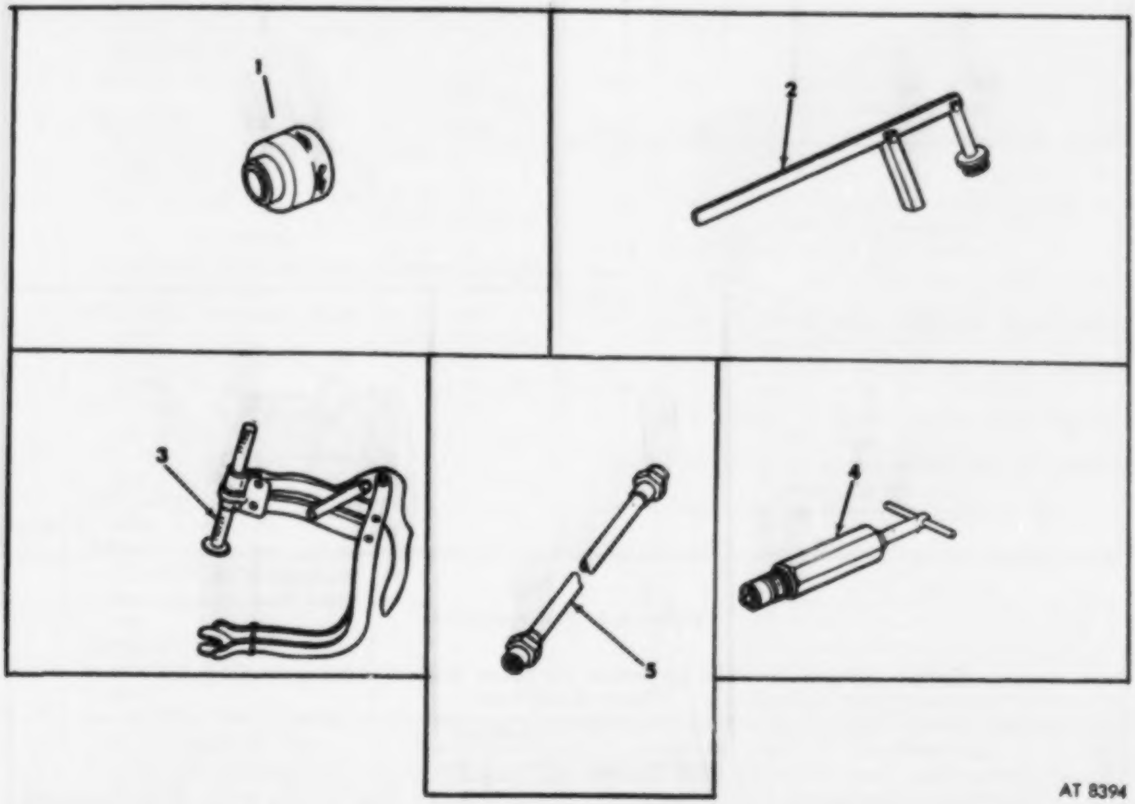

1
2
3
5
4
AT 8394

Figure 2–8. Special tools.

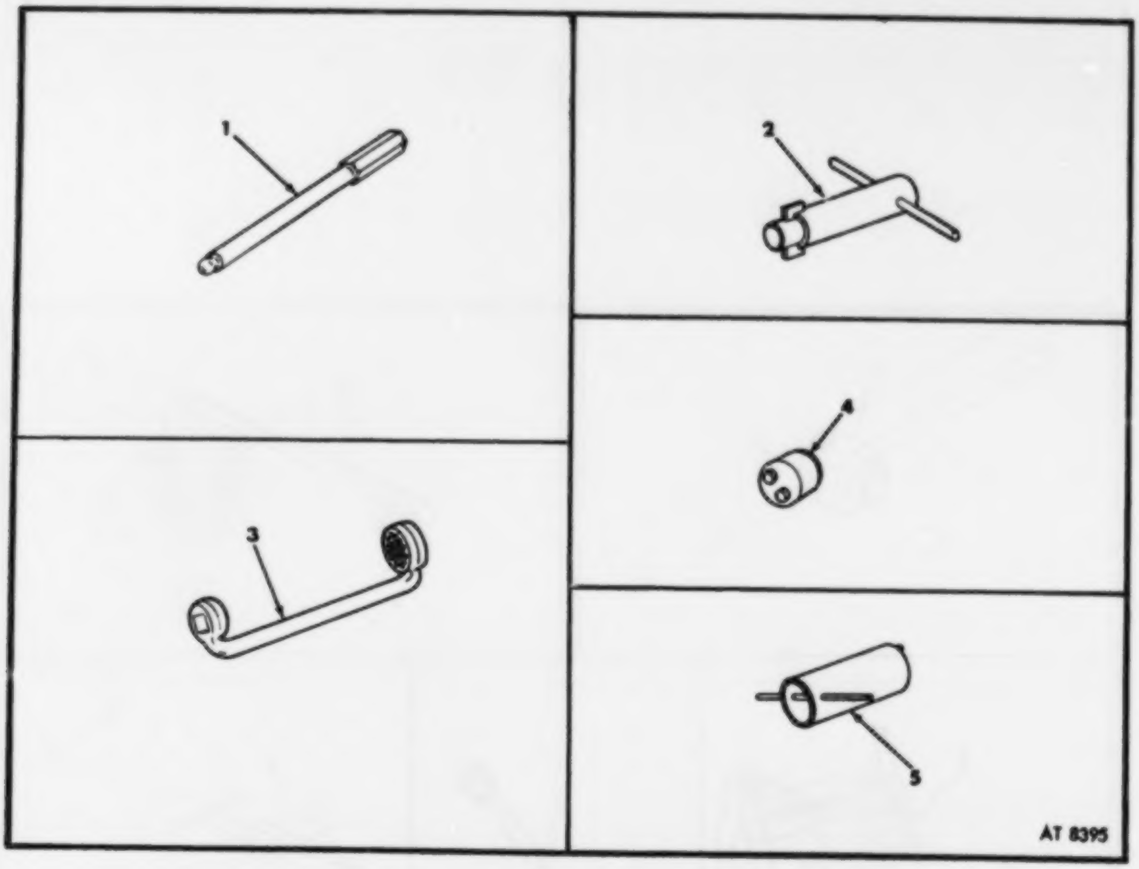


Figure 2-9. Test equipment.

Table 1. Special Tools and Equipment for Direct Support, General Support, and Depot Maintenance

Key No.	Item	Identification number	Reference		Use
			Fig.	Par.	
1	ADAPTER, connecting rod capscrew wrench.	17-T-1560 (4910-977-7417)	2-1	5-15	Used to remove or install connecting rod capscrews.
2	ADAPTER, cylinder compression tester.	17-T-11176 (4910-977-7402)	11-1 2-1	11-1	Used w/diesel cylinder compression gage to test cylinder compression.
3	ADAPTER, overhaul stand, front.	10938061 (4910-996-7257)	4-1 2-1	4-3	Used for mounting engine on cradle and stand.
1	ADAPTER, overhaul stand, rear.	10938060 (4910-996-7256)	4-1 2-2	4-3	Used for mounting engine on cradle 7950198 and stand 7950189.
1	BRUSH, carbon removing	17-T-112 (4910-977-7405)	7-36 2-3	7-28	Used for cleaning carbon from injector nozzles.
2	CAP, fuel inlet protection (12 req).	17-T-1549A (4910-977-7403)	5-9 2-3	5-5 11-1	Used to seal fuel injection pump delivery valves.
3	COUPLING, drive, injection pump.	17-T-11412 (4910-981-2770)	7-34 2-3	7-47	Used to drive and time the fuel injection pump on test stand.
4	EXTRACTOR, fuel injection pump delivery valve.	17-T-11105 (5120-977-7404)	7-25 2-3 2-10	7-31 10-2	Used for removal of fuel injection pump delivery valve.

Table 1. Special Tools and Equipment for Direct Support, General Support, and Depot Maintenance

Key No.	Item	Identification number	Reference		Use
			Fig.	Par.	
5	GAGE, water pump impeller setting.	17-T-11810 (4910-977-8967)	2-3 6-77	6-87	Used to set clearance of rotor to housing.
6	INSTALLER, driver nozzle sleeve.	17-T-11395 ( )	2-3	6-32	Used to install injector nozzle sleeve.
7	INSTALLER, water pump bearings and seal.	11644677 ( )	2-3	6-87	Used to install water pump bearings and seal.
1	LEVER, TORQUE ADAPTER, injection pump governor drive slip clutch (used w/spring scale 6670-526-8706).	17-T-11421 (5120-321-6582)	2-4	7-33	To check clutch slippage.
2	LIFTER, tappet	17-T-1966 (5120-977-7406)	2-4	7-31	Used for removing or installing fuel injection pump tappets.
3	NEEDLES, ORIFICE CLEANING, injection nozzle (set of 5).	17-T-11099 (4910-977-7407)	2-4 7-29	7-36	Used to clean injection nozzle spray holes.
4	PIN, tappet retaining	17-T-1970 (4910-977-7408)	7-19 2-5	7-31	Used for retaining tappet during assembly or disassembly.
5	PLUG, MACHINE THREAD, fuel line protection (12 req).	49-AX-61 (4730-981-2767)	5-11 2-4 10-1	5-5 10-2	Used to plug high pressure.
6	PULLER, governor drive gear.	17-T-11223 (5120-977-7409)	2-4	7-31	Used to remove governor clutch from camshaft.
7	PULLER, PLUNGER, injection pump.	17-T-1550 (5120-422-8967)	2-5 7-23	7-31	To remove plunger and lower spring seat.
8	REAMER, carbon removing, nozzle.	17-T-11103 (5110-977-7411)	2-5	6-30	Used to remove carbon from injector nozzle sleeve.
9	REAMER, governor operating lever.	17-T-11242 (5110-977-7410)	2-5	7-29	Used to ream governor operating shaft bushings to size.
10	REAMER, valve guide .5000 ± .0005 dia.	17-T-1793 ( )	2-5	6-32	Used to ream valve guides to size.
11	REMOVER AND REPLACER KIT, camshaft and auxiliary shaft bearing.	11644695 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
	Composed of:				
1	1—DRIVE BAR, 19 inches long.	11644680 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
2	1—DRIVE BAR EXTENSION, 24 inches long.	11644679 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
3	1—DRIVER, camshaft and auxiliary shaft bearing and replacer.	11644674 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
4	1—GUIDE PLUG, camshaft bearing remover and replacer.	11644678 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
5	1—REMOVER AND REPLACER, auxiliary shaft front bearing.	11644675-3 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
6	1—REMOVER AND REPLACER, auxiliary shaft rear bearing.	11644675-2 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
7	1—REMOVER AND REPLACER, camshaft No. 1 bearing.	11644675-1 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
8	1—REMOVER AND REPLACER, camshaft Nos. 2, 3, 4, 5, and 6 bearings.	11644676-1 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.

***Table 1. Special Tools and Equipment for Direct Support, General Support, and Depot Maintenance*—Continud**

Key No.	Item	Identification number	Reference		Use
			Fig.	Par.	
11	REMOVER AND REPLACER KIT, camshaft and auxiliary shaft bearing—Continued Composed cf—Continued:		2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
9	1—REMOVER AND REPLACER, camshaft No. 7 bearing.	11644672-2 ( )	2-6	6-10	To remove and replace camshaft and auxiliary shaft bearings.
10	1—STORAGE BOX, camshaft and auxiliary shaft bearing remover and replacer.	11644693 ( )	2-6	6-10	To store camshaft and auxiliary shaft remover and replacer kit.
1	RING, FLANGE ADAPTER.	17-T-11411 (4910-961-2771)	2-7 7-34	7-47	Used to couple fuel injection pump to test stand.
2	ROD, DRIVE, control rack outer bushing.	17-T-1979 (4910-977-7412)	2-7	7-32	Used to remove and replace outer bushing.
3	SCRAPER, injection nozzle body pressure chamber.	17-T-1896 ( )	2-7	7-36	Used to scrape carbon from inside nozzle pressure chamber.
4	SLEEVE, CENTERING, injection nozzle reassembly.	17-T-11104 ( )	2-7 7-30	7-39	Used to center nozzle in protection cover.
1	TOOL, ALINEMENT, timing gear cover 4-inch bearing crankshaft.	17-T-11097 ( )	2-8 9-3	9-6	To aline timing gear cover.
2	TOOL, COMPRESSING, injection pump tappet.	17-T-1975 (5120-862-9371)	2-8	7-33	For compressing tappet during assembly of retaining pin.
3	TOOL, compression plunger spring.	17-T-1976 (4910-977-7419)	2-8 7-19	7-31	For compressing plunger spring during disassembly and assembly, or timing .pump.
4	TOOL, VALVE, seat reconditioning.	17-T-1933 (5120-977-7418)	2-8	7-22	To recondition valve seat for fuel supply pumps.
5	TUBE, NOZZLE FUEL INLET, test fuel injection pump.	203-GCA-170 (4910-951-2768)	2-8 7-33	7-48	To calibrate fuel injection pump on test stand.
1	VISE, needle	17-T-11100 (4910-977-7416)	2-9 7-29	7-36	To hold cleaning needles.
2	WRENCH, control rack outer bushing.	17-T-1973 (4910-977-8971)	2-9		To remove or replace outer rack bushing.
3	WRENCH, cylinder head nut.	10951484 (5120-937-7834)	2-9		For retorquing cylinder head stud nuts with rocker arm shaft in position.
4	WRENCH, PRONGED, injection pump bottom plug.	10882351 (5120-793-5045)	2-9 7-23		To remove base plugs.
5	WRENCH, PRONGED, injection pump governor drive gear.	TSE 7920 (American Bosch) (5120-321-6517)	2-9	7-31	To remove locknut from governor clutch drive gear.

2-5. Improvised Tools

Improvised tools are of chief value for direct support, general support, and depot maintenance engaged in rebuilding a large number of identical components, however; they are not essential for rebuild and are not available for issue. The detailed dimensional drawings in figures 2-10 through 2-14 are to enable these maintenance organizations to fabricate these tools locally if desired. This data is furnished for information only.

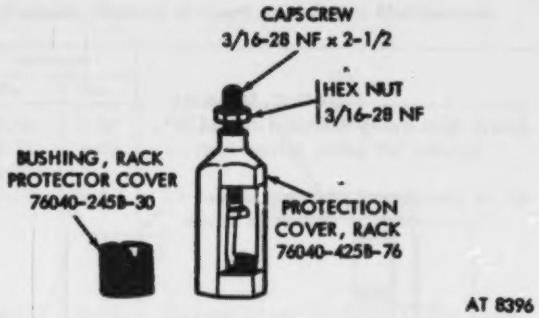

CAPSCREW 3/16-28 NF x 2-1/2
HEX NUT 3/16-28 NF
BUSHING, RACK PROTECTOR COVER 76040-2458-30
PROTECTION COVER, RACK 76040-4258-76
AT 8396

Figure 2-10. Improvised tool-rack extension gage.

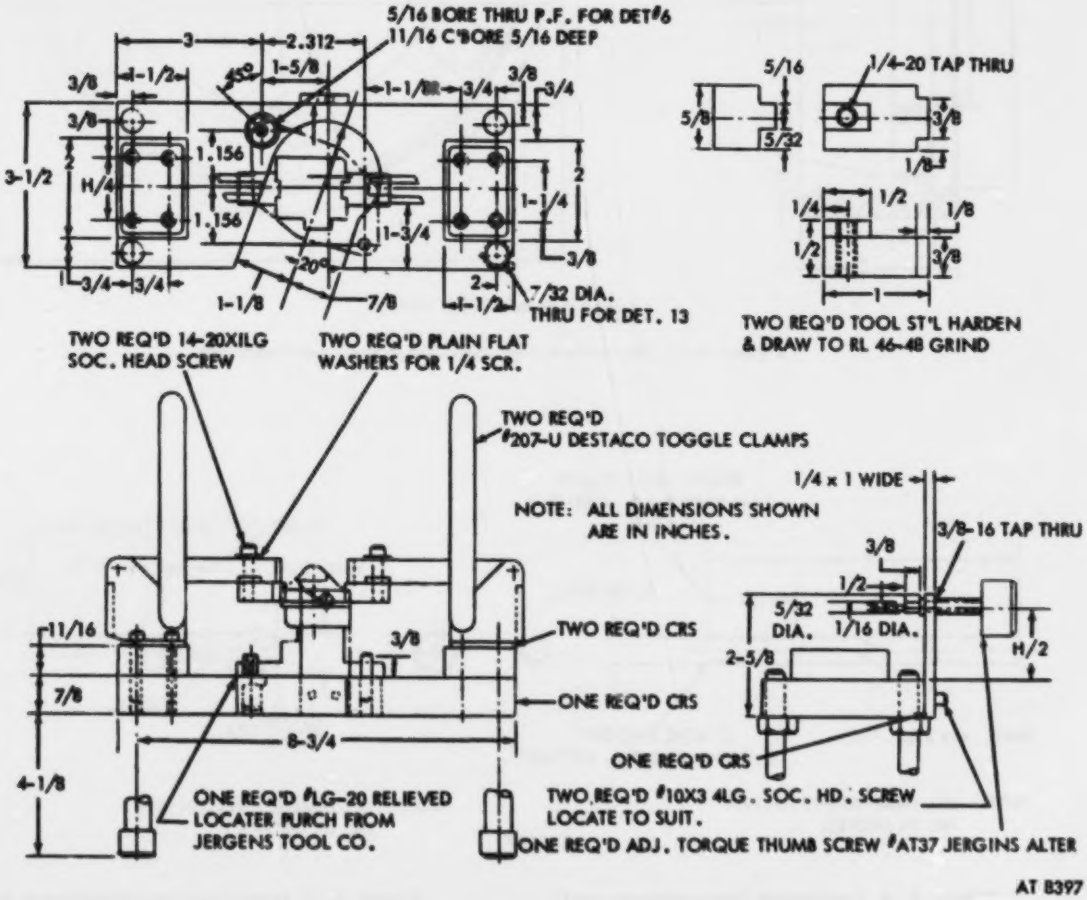

5/16 BORE THRU P.F. FOR DET#6
11/16 C'BORE 5/16 DEEP
3
2.312
3/8
1-1/2
45°
1-5/8
1-1/8
3/4
3/8
3/4
3/8
3-1/2
H/4
1.156
1.156
2
1-1/4
1-3/4
3/8
20°
3/4
3/4
1-1/8
7/8
2
1-1/2
7/32 DIA. THRU FOR DET. 13
5/16
1/4-20 TAP THRU
5/8
5/32
3/8
1/8
1/4
1/2
1/8
1/2
3/8
1
TWO REQ'D TOOL ST'L HARDEN & DRAW TO RL 46-48 GRIND
TWO REQ'D 14-20XILG SOC. HEAD SCREW
TWO REQ'D PLAIN FLAT WASHERS FOR 1/4 SCR.
TWO REQ'D #207-U DESTACO TOGGLE CLAMPS
NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.
1/4 x 1 WIDE
3/8-16 TAP THRU
3/8
1/2
5/32 DIA.
1/16 DIA.
H/2
2-5/8
11/16
3/8
TWO REQ'D CRS
7/8
ONE REQ'D CRS
8-3/4
ONE REQ'D CRS
4-1/8
ONE REQ'D #LG-20 RELIEVED LOCATER PURCH FROM JERGENS TOOL CO.
TWO REQ'D #10X3 4LG. SOC. HD. SCREW LOCATE TO SUIT.
ONE REQ'D ADJ. TORQUE THUMB SCREW #AT37 JERGINS ALTER
AT 8397

Figure 2-11. Improvised tool-flame heater pump fixture.

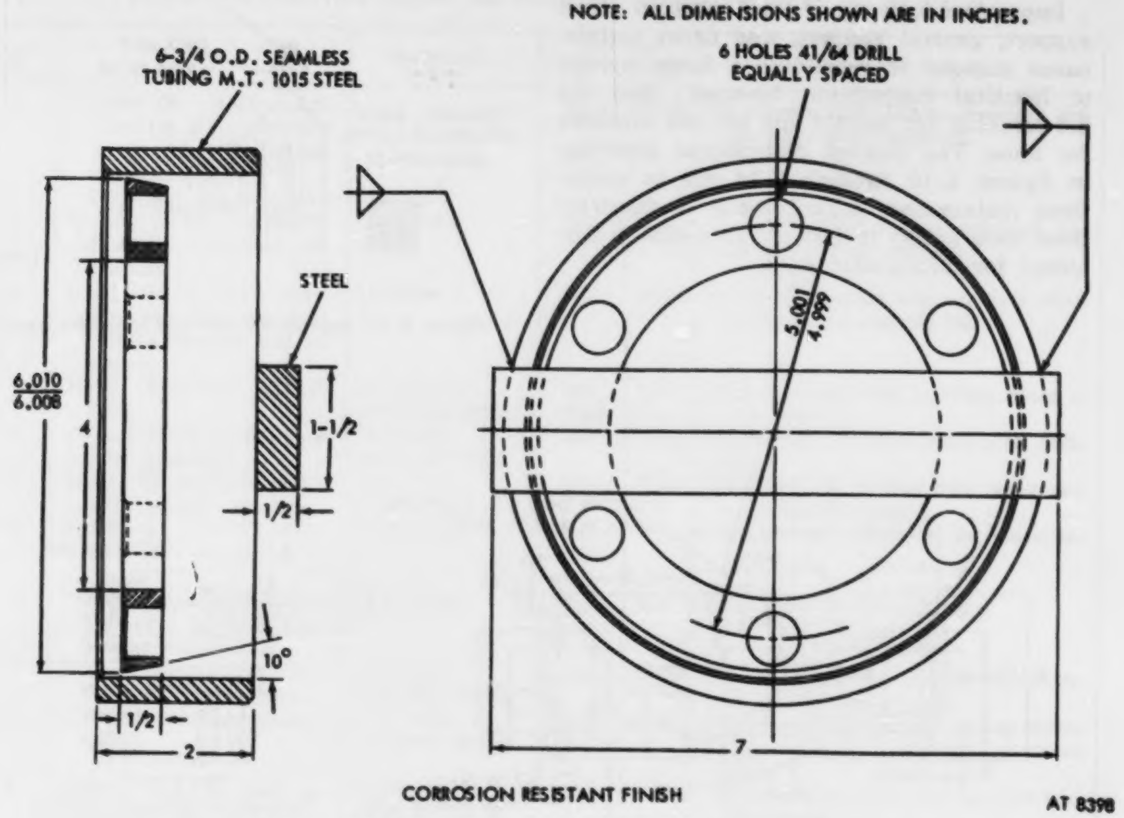

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.
6-3/4 O.D. SEAMLESS TUBING M.T. 1015 STEEL
6 HOLES 41/64 DRILL EQUALLY SPACED
STEEL
6.010
6.008
4
1-1/2
1/2
10°
1/2
2
5.001
4.999
7
CORROSION RESISTANT FINISH
AT 8398

Figure 2-12. Improvised tool–crankshaft rear seal installer.

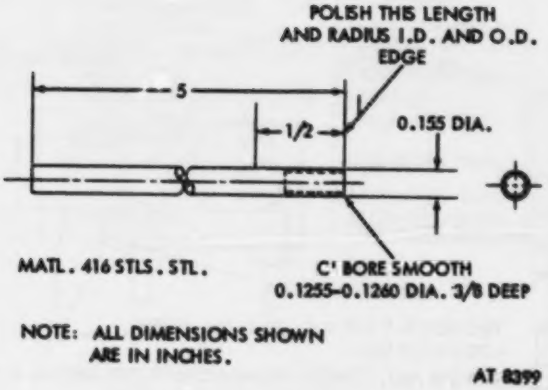

POLISH THIS LENGTH AND RADIUS I.D. AND O.D. EDGE
5
1/2
0.155 DIA.
MATL. 416 STLS. STL.
C' BORE SMOOTH 0.1255–0.1260 DIA. 3/8 DEEP
NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.
AT 8399

Figure 2-13. Improvised tool–protection tool.

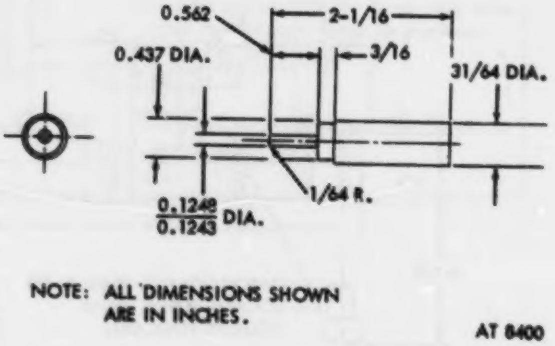

0.562
2-1/16
0.437 DIA.
3/16
31/64 DIA.
1/64 R.
0.1248
0.1243
DIA.
NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.
AT 8400

Figure 2-14. Improvised tool–installation tool.

Table 2. Improvised Tools and Equipment for Direct Support, General Support, and Depot Maintenance

Key No.	Item	Reference		Use
		Fig.	Par.	
1	GAGE, rack extension	2–10	7–48	To adjust injection pump rack travel.
2	FIXTURE, flame heater pump	2–11 6–72	6–79	To hold heater pump for rebuild.
3	INSTALLER, crankshaft rear seal (11644694). Consists of: A—INSTALLER, plate (11644684). B—GUIDE, seal (11644681).	2–12	9–3	To install crankshaft rear seal in flywheel housing.
4	TOOL, protection	2–13 6–71	6–79	To install seal in flame heater pump.
5	TOOL, installation	2–14 6–70	6–79	To protect flame heater pump seal during assy.

CHAPTER 3

TROUBLESHOOTING

Section I. GENERAL

3-1. Purpose

a. Information in this chapter is for use of maintenance personnel in conjunction with and as a supplement to the troubleshooting section of the pertinent organizational maintenance manual. It provides a continuation of instructions where a remedy in the organizational maintenance manual refers to higher level maintenance personnel for the corrective action.

b. Operation of a deadlined vehicle without a preliminary examination can cause further damage to a disabled component. By careful inspection and troubleshooting, such damage and injury can be avoided. The causes of faulty operation of a vehicle or component can often be determined without extensive disassembly.

3-2. General Instructions

a. This chapter contains inspection and troubleshooting procedures to be performed while a disabled engine is still mounted in the vehicle, as well as after it has been removed. The inspections made while the engine is mounted in the vehicle are mostly visual and are to be performed before attempting to operate the vehicle. The object of these inspections is to avoid possible damage or injury, and also to determine the condition of, and when possible, what is wrong with the engine.

b. The troubleshooting performed while the engine is mounted in the vehicle is that which is within the normal scope of the using organization. Check the troubleshooting section of TM 9-2320-211-20, then proceed as outlined in this chapter. These troubleshooting operations are used to determine if the fault can be remedied without removing the engine from the vehicle and, also, when subsequent removal is necessary; and to indicate when repair can be made without complete disassembly of the engine.

c. Inspection after the engine is removed from the vehicle is performed to verify the diagnosis made while the engine was mounted in the vehicle, to uncover further defects, or to determine faults if the engine alone is received by the maintenance establishment. This inspection is particularly important in the last case because it is often the only means of determining the trouble without completely disassembling the engine.

Section II. TROUBLESHOOTING PROCEDURES

3-3. General

Most engine troubles are actually engine accessory troubles. The troubleshooting portion of the pertinent organizational maintenance manual normally will cover troubleshooting of all engine accessories while mounted on the engine. For complete coverage of accessories refer to pertinent manuals listed in paragraph 1-1. The procedures for troubleshooting the engine assembly and the engine accessories are listed in table 3. Malfunctions of the engine assembly are referenced to the appropriate accessory system for corrective action when applicable.

3–4. Test Equipment

Use test equipment such as ohmmeter, voltmeter, test lamp, hydrometer, manometer, pressure or vacuum gages. When properly used they will help to locate many types of leaks, shorts, opens, and wiring breaks. Other individual instruments are used to test cylinder compression and lubricating oil pressures.

3–5. Process of Elimination

Troubleshooting is a process of reasoning supported by deductions and elimination of all possible causes. Many engine defects are common to both high oil consumption and overheating. Often a search for the cause of one trouble will disclose a need for correction of another.

3–6. Troubleshooting Noises

One of the most difficult of all troubleshooting procedures, and one which is required often, is locating the source of unusual noise in an engine. All rotating or reciprocating parts of an engine are potential sources of noise. However, certain noises possess characteristics which help to identify them. It is often helpful to use an instrument of the stethoscope type to magnify the intensity of the noise and locate its source more quickly.

3–7. Operating Noises

Slight mechanical knocks which give advance warning of bearing troubles in a gasoline engine are more difficult to detect in a diesel engine due to the high pressures encountered in a diesel cylinder, which cause the normal sound level to be higher. Reduced lubricating oil pressure accompanied by higher coolant temperature would be a more dependable indicator of bearing difficulties developing in a diesel engine. Severe mechanical knocks are usually the result of wear, abuse, or improper adjustments.

Table 2. Troubleshooting

Malfunction	Probable cause	Corrective action
	MAIN ENGINE	
1. Engine will not crank	a. Incorrect engine oil viscosity (cold weather only).	a. Refer to LO 9–2320–211–12.
	b. Defective batteries, wiring connections, or starting system.	b. Refer to TM 9–2320–211–20 for troubleshooting vehicle electrical system.
	c. Starter or solenoid defective	c. Replace solenoid or starter. Refer to TM 9–2320–211–20 for procedures.
	d. Defective starter drive gear	d. Remove starter (TM 9–2320–211–20) and replace starter drive gear adapter.
	e. Mechanical or hydraulic seizure	e. Remove fuel injector nozzles. Turn engine over several times to displace liquid from the cylinders through the injector or nozzle openings. If the engine can be turned freely, after all liquid has been displaced, install the nozzles and start engine. If the engine cannot be turned over freely by hand, inner parts of the engine have been damaged and engine must be disassembled to replace the defective parts.
2. Engine cranks but fails to start.	a. Fuel injector pump not properly timed.	a. Time fuel injector pump (par. 10–2).
	b. Defective fuel injector pump or supply pump.	b. Repair fuel injector pump (Chapter 7).

Table 3. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
	MAIN ENGINE—Continued	
2. Engine cranks but fails to start—continued.	c. Clogged fuel filter or line	c. Check for fuel flow and injection pump inlet fuel pressure.
	d. Stripped or broken injector pump driven gear, camshaft gear, or crankshaft gear.	d. Remove timing gear cover (par. 5–14) and inspect gears for broken or stripped teeth (par. 6–55). Replace broken or stripped gears (par. 6–56).
	e. Low cylinder compression	e. Make cylinder compression check and take appropriate action to correct condition as follows: (1) Leaky cylinder head gasket. Replace gasket (par. 5–8). (2) Leaking valves. Remove cylinder head and grind valves (par. 6–32). (3) Worn piston rings, rings broken or improperly fitted. Replace piston rings (pars. 6–19 and 6–20).
	f. Insufficient cranking speed	f. Check starter and electrical system. Refer to TM 9–2320–211–20 for troubleshooting electrical system.
3. Engine runs rough, with one or more cylinders not firing.	a. Engine operating at below normal temperature.	a. Replace thermostats. Refer to TM 9–2320–211–20 for procedures.
	b. Leaking fuel injector nozzle lines	b. Tighten or replace leaking fuel injector lines (par. 5–5).
	c. Defective fuel injector nozzles	c. Replace defective fuel injector nozzles (par. 5–7).
	d. Improper valve adjustment	d. Check and reset valve clearance (par. 9–9).
	e. Bent or broken push rod, worn camshaft lobe, or broken valve tappet.	e. Replace defective push rod (par. 6–36). Disassemble engine as necessary to replace worn camshaft, damaged piston, or damaged valve tappet.
	f. Leaking or blown cylinder head gasket.	f. Remove cylinder head (par. 5–8) and install new gasket.
4. Engine low on power	a. One or more cylinders not firing	a. Refer to item 3 above.
	b. Fuel injector pump not properly timed.	b. Time fuel injector pump (par. 10–2).
	c. Improper fuel injector pump operating lever setting.	c. Adjust fuel injector pump operating lever setting.
	d. Improper fuel being used	d. Drain fuel tanks and fill with proper specification fuel. Refer to TM 9–2320–211–10 for proper fuel.
	e. Engine overheated	e. Refer to 3a above.
	f. Defective turbocharger	f. Replace turbocharger (TM 9–2320–211–20).
	g. Leaking engine exhaust system causing reduced pressure to turbocharger.	g. Repair exhaust system leaks or replace exhaust system components (TM 9–2320–211–20).
	h. Low cylinder compression	h. Refer to item 2e for corrective action.
	i. Clogged fuel filter	i. Replace filter element.

Table 3. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
5. Excess engine power or engine overspeeds.	a. Improper fuel injector pump operating lever setting.	a. Adjust fuel injector pump (par. 10-2).
	b. Improper fuel injector pump timing.	b. Check and adjust fuel injector pump timing (par. 10-2).
	c. Improper fuel injector governor setting.	c. Reset governor. Refer to paragraph 11-4 for procedures.
	d. Defective fuel injector pump	d. Repair fuel injector pump (Chapter 7).
6. Engine will not idle, but runs well under load.	a. Defective fuel injector nozzles	a. Replace defective fuel injector nozzles (par. 5-7).
	b. Fuel injector pump governor not properly adjusted.	b. Adjust fuel injector pump governor. Refer to paragraph 11-4 for procedures.
	c. Fuel injector pump not properly timed.	c. Time fuel injector pump (par. 10-2).
	d. Defective fuel injector pump	d. Repair fuel injector pump (Chapter 7).
7. Engine smokes. (1) White or gray smoke, indicating unburned fuel or engine oil.	a. Defective fuel injector nozzles	a. Replace defective fuel injector nozzles (par. 5-7).
	b. Engine cylinders and intake air too cold for efficient combustion.	b. Operate engine under load to increase cylinder head temperatures.
	c. Scored or worn pistons, rings, or cylinders.	c. Remove and replace pistons, rings (par. 6-18) or cylinder sleeves (par. 6-10).
	d. Water in fuel	d. Service fuel filters. Drain fuel tanks. Refer to TM 9-2320-211-20 and refill with clean fuel.
(2) Blue smoke, indicating admittance of engine oil into combustion chamber.	a. One or more cylinders not firing	a. Refer to item 3 above for corrective action.
	b. Worn or stuck piston rings or worn cylinder sleeves.	b. Remove cylinder heads (par. 5-8). Remove oil pan (par. 5-12). Remove pistons (par. 5-15). Remove cylinder sleeves (par. 6-6).
	c. Worn valve guides	c. Remove cylinder heads (par. 5-8). Replace valve guides (par. 6-32).
(3) Black smoke, indicating a rich fuel mixture.	a. Improper fuel injector pump rack setting.	a. Adjust fuel injector pump rack setting. Refer to Chapter 7 for procedures.
Note. Black smoke during acceleration is normal.	b. Fuel injector pump not properly timed.	b. Time fuel injector pump (par. 10-2).
	c. Defective fuel injector pump	c. Rebuild defective fuel injector pump (Chapter 7).
	d. Defective turbocharger	d. Replace turbocharger. Refer to TM 9-2320-211-20.
8. Engine noise. (1) Knocking noise	a. Worn engine bearings	a. Replace engine bearings (par. 5-16).
	b. Excessive crankshaft end play	b. Replace main thrust bearing (par. 5-16).
	c. Scored piston or cylinder	c. Replace piston or cylinder (par. 5-15).

***Table 3. Troubleshooting*—Continued**

Malfunction	Probable cause	Corrective action
	***MAIN ENGINE*—Continued**	
(2) Tapping noise	**a. Excessive valve clearance**	**a. Adjust valve clearances (par. 9-9).**
	b. Defective or worn valve rocker assembly.	**b. Replace defective valve rocker assembly (par. 6-39).**
(3) Grinding or squealing noise.	**a. Defective bearings or gears**	**a. Use suitable tool and turn engine over by hand. If engine turns hard and grinding or squealing noise persists, disassemble engine and repair or replace defective parts.**
	b. Starter continuously operating	**b. Replace solenoid. Refer to TM 9-2320-211-20.**
9. Rough or poor idling	**Fuel injector pump out of adjustment.**	**Adjust fuel injector pump (par. 11-8).**
10. Engine surges	**a. Throttle linkage sticking or binding.**	**a. Inspect, clean, and lubricate linkage. Refer to TM 9-2320-211-20.**
	b. Fuel injector pump governor not properly adjusted.	**b. Adjust fuel injector pump governor. Refer to paragraph 11-4.**
	STARTING SYSTEM	
11. Starter will not operate	**a. No electrical current reaching starter.**	**a. Refer to TM 9-2320-211-20 for troubleshooting the electrical system.**
	b. Defective starter	**b. Refer to TM 9-2320-211-20 for replacement of starter.**
12. Starter runs but will not crank engine.	**a. Defective starter drive gear**	**a. Replace starter drive gear. Refer to pertinent starter TM (par. 1-1).**
	b. Defective starter drive gear	**b. Replace starter drive. Refer to pertinent starter TM (par. 1-1) for replacement of starter drive.**
	GENERATOR SYSTEM	
13. Generator runs but will not charge.	**a. Defective generator-regulator**	**a. Refer to TM 9-2320-211-20 for troubleshooting the generator-regulator.**
	b. Improperly connected generator cables.	**b. Refer to TM 9-2320-211-20 for correct connections.**
	c. Defective generator	**c. Replace generator (refer to TM 9-2320-211-20 for procedures).**
	AIR INTAKE SYSTEM	
14. Restricted turbocharger air intake hoses or system.	**a. Plugged air cleaner**	**a. Service air cleaner. Refer to TM 9-2320-211-20 for procedures.**
	b. Collapsed air induction hose	**b. Repair or replace air induction hose. Refer to TM 9-2320-211-20 for procedures.**
	c. Defective turbocharger	**c. Replace turbocharger. Refer to TM 9-2320-211-20 for procedures.**
15. Loss of engine power	**Air leak in intake manifold gasket or hoses.**	**Replace manifold gaskets. Refer to TM 9-2320-211-20 for procedures.**
	FUEL SYSTEM	
16. No fuel being delivered at fuel injector nozzle and holder assemblies.	**a. Defect in vehicle fuel system**	**a. Troubleshoot vehicle fuel system. Refer to TM 9-2320-211-20 for procedures.**

Table 3. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
	b. Primary fuel filter clogged	b. Replace primary fuel filter. Refer to TM 9-2320-211-20 for procedures.
	c. Secondary fuel filter clogged	c. Replace secondary fuel filter element (TM 9-2320-211-20).
	d. Damaged fuel lines and tubes	d. Replace defective or damaged fuel lines or tubes (par. 5-5).
	e. Defective fuel injector pump or fuel return valve on pump.	e. Check fuel return valve. Refer to TM 9-2320-211-20. Remove fuel injector pump (par. 5-6). Refer to Chapter 7 for rebuild procedures.
17. Fuel being delivered at nozzles, but engine will not run, start, or runs rough on one or more cylinders.	a. Defective fuel injector nozzle and holders.	a. Remove fuel injector and holder assemblies (par. 5-7). Test, adjust, and repair fuel injector nozzles and holder assemblies (Chapter 7).
	b. Defective intake manifold	b. Troubleshoot intake manifold system. Refer to TM 9-2320-211-20 for procedures.
	c. Partially plugged fuel filters or fuel is contaminated.	c. Replace primary and secondary fuel filter; drain fuel tank. Refer to TM 9-2320-211-20.
	d. Defective fuel injector pump	d. Remove fuel injector pump (par. 5-6). Rebuild fuel injector pump. Refer to Chapter 7.
	e. Leaking fuel return. Check valve on fuel injector pump.	e. Check fuel return valve. Replace valve if necessary. Refer to TM 9-2320-211-20 for procedures.
18. Engine runs hot, misfires, or runs rough.	a. Insufficient fuel pressure from supply (lean mixture).	a. Replace primary and secondary fuel filter. Refer to TM 9-2320-211-20 for procedures. Replace fuel supply pump (Chapter 7). Replace fuel injector (par. 5-6).
	b. Improperly adjusted fuel injector pump causing decreased fuel delivery.	b. Refer to Chapter 7 and adjust fuel injector pump.
	c. Leaking fuel injector tube to nozzle and holder assembly.	c. Repair or replace fuel injector tube (par. 5-5).
19. Engine exhaust smoke is excessive and engine runs rough.	a. Fuel injector pump improperly adjusted causing increased fuel delivery (rich mixture).	a. Refer to Chapter 7 and adjust fuel injector pump.
	b. Low oil pressure to fuel injector pump.	b. Refer to lubrication system troubleshooting (TM 9-2320-211-20) for causes of low oil pressure.
	c. Defective fuel injector pump or turbocharger.	c. Replace fuel injector pump (par. 5-6) or turbocharger (TM 9-2320-211-20).
	LUBRICATION SYSTEM	
20. Low engine oil pressure	a. Low oil level, faulty oil pressure gage, sending unit, or oil diluted.	a. Add oil, check pressure gage, and replace faulty oil pressure sending unit. Refer to TM 9-2320-211-20 for procedures. Change oil as recommended in

Table 3. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
	LUBRICATION SYSTEM—Continued	
20. Low engine oil pressure—Continued		LO 9-2320-211-12. Replace oil filter elements. Refer to TM 9-2320-211-20 for procedures.
	b. Defective oil pressure regulator valve.	b. Remove oil pressure, regulator valve, and repair. Refer to TM 9-2320-211-20 for procedures.
	c. Obstructed oil pickup tube, screen, or obstructed engine oil passages.	c. Remove oil pan (par. 5-12). Check screen for obstruction or plugged condition. Disassemble engine (pars. 4-5 thru 5-19). Clean and inspect all oil passages.
	d. High engine oil temperature, defective water pump, or plugged oil cooler.	d. Refer to cooling system, item 26, probable cause and corrective action.
	e. Defective oil pump	e. Remove oil pan (par. 5-12). Replace oil pump assembly (par. 5-13).
	f. Worn main bearings, connecting rod bearings, or camshaft bearings (bushing-type).	f. Disassemble engine (pars. 4-5 thru 5-19). Replace main bearings, rod bearings, and camshaft bearings.
21. High engine oil pressure	a. Faulty oil pressure sending unit or improper grade of engine oil for prevailing temperatures.	a. Change oil to recommended grade as directed in LO 9-2320-211-20. Check engine temperature gage. Refer to TM 9-2320-211-20 for procedures. Replace oil pressure sending unit. Refer to TM 9-2320-211-20 for procedures.
	b. Defective oil pressure regulator valve.	b. Remove oil pressure regulator valve. Refer to TM 9-2320-211-20 for procedures.
	c. Obstructed oil passages	c. Refer to item 20c above.
22. No engine oil pressure	a. Low oil level or defective pressure gage.	a. Add oil. Check pressure gage. Refer to TM 9-2320-211-20 for procedures.
	b. Obstructed oil passages or defective oil pressure control valve or spring.	b. Replace oil pressure relief valve (par. 5-13).
	c. Defective oil pump or drive gears.	c. Remove oil pan (par. 5-12). Replace oil pump assembly (par 5-13).
23. High engine oil temperature.	a. Improper grade oil for prevailing temperature.	a. Drain crankcase and refill with proper grade oil for prevailing temperature. Refer to TM 9-2320-211-20 and LO 9-2320-211-10.
	b. Insufficient oil in oil pan	b. Fill to proper level. Refer to TM 9-2320-211-20 and LO 9-2320-211-12.
	c. Restricted oil cooler or defective oil cooler bypass.	c. Remove oil cooler (par. 5-3).
	d. High engine coolant temperature	d. Refer to cooling system troubleshooting, item 26.

Table 8. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
	LUBRICATION SYSTEM—Continued	
	e. Lean fuel mixture	e. Refer to fuel system troubleshooting, item 16.
	f. Tight engine bearings	f. Disassemble engine (pars. 4-5 thru 5-19).
24. Low engine oil temperature (winter operation).	Defective coolant system thermostat or the thermostat has improper heat range.	Replace thermostat. Refer to TM 9-2320-211-20 for procedures.
25. Excessive oil consumption	a. High oil temperature	a. Refer to item 23 above.
	b. Restricted crankcase breather tube.	b. Remove and clean crankcase breather tube (par. 5-8).
	c. Worn piston rings, pistons, or sleeves.	c. Disassemble engine (pars. 4-5 thru 5-19) and replace defective parts.
	d. Worn valve stems or guides	d. Remove cylinder head or heads (par. 5-8). Replace valves or valve guides (par. 6-28).
	COOLING SYSTEM	
26. Engine overheats	a. Broken fan belts or restricted radiator or engine coolant system.	a. Replace fan belt or reverse flush engine coolant system. Refer to TM 9-2320-211-20 for procedures.
	b. Defective coolant thermostat or sending unit.	b. Replace thermostat or sending unit. Refer to TM 9-2320-211-20 for procedures.
	c. Defective or plugged water pump.	c. Replace water pump. Refer to TM 9-2320-211-20 for procedures. Repair water pump (par. 6-82).
	d. Lean fuel mixture	d. Refer to fuel system troubleshooting, item 16.
	e. Defective oil pressure relief valve or plug.	e. Refer to lubrication troubleshooting, item 22.
27. Engine fails to reach normal operating temperature.	a. Defective coolant thermostat has improper heat range.	a. Replace thermostat. Refer to TM 9-2320-211-20 for procedures.
	b. Defective water temperature, sending unit, or gage.	b. Replace sending unit. Refer to TM 9-2320-211-20 for procedures.
28. Loss of coolant	a. Loose or damaged hoses, hose connections, or gaskets leaking.	a. Refer to TM 9-2320-211-20 for repair. Replace hoses and connections.
	b. Water pump seal leaking	b. Remove water pump. Refer to TM 9-2320-211-20 for procedures. To repair water pump, refer to paragraph 6-82.
	c. Cylinder head gasket defective, or cylinder heads warped.	c. Check cylinder heads (par. 5-8). Replace cylinder head gaskets (par. 5-8).
	d. Cylinder or crankcase corehole plugs leaking.	d. Remove and replace leaking corehole plugs. Refer to paragraph 6-28 for cylinder head plugs and paragraph 6-93 for crankcase core plugs.
	e. Leaking oil cooler or oil cooler gaskets.	e. Remove oil cooler (par. 5-8), and install new gaskets.

Table 3. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
	COOLING SYSTEM—Continued	
28. Loss of coolant—Continued	f. Leaking oil cooler water inlet tube.	f. Replace oil cooler water inlet tube (par. 5-3).
	INTAKE MANIFOLD HEATER FUEL SYSTEM	
29. No fuel to intake manifold	a. Fuel filter plugged	a. Clean or replace fuel filter. Refer to TM 9-2320-211-20 for procedures in removing primary fuel filter and for replacement of secondary fuel filter element.
	b. Fuel pump (electrical) not operating.	b. Check fuel pump electrical circuit (TM 9-2320-211-20). Remove fuel pump and repair fuel pump (Chapter 7).
	c. Defective fuel inlet or outlet solenoid valves.	c. Replace valve solenoid (par. 4-11). For repair procedures, refer to paragraph 6-78.
	d. Broken wires in ignition harness	d. Replace harness (par. 4-11). For repairing harness, refer to paragraph 6-77.
	e. Heater, spray nozzle, or tubes restricted or plugged.	e. Remove restrictions. Replace spray nozzle (par. 4-11). For repair procedures, refer to paragraph 6-80.
30. Fuel to intake manifold heater will not ignite.	a. Defective spark plug	a. Replace spark plug. Refer to TM 9-2320-211-20 for procedures.
	b. Defective ignition unit	b. Replace defective unit. Refer to TM 9-2320-211-20 for procedures.
	c. Defective ignition harness of ignition unit to heater cable.	c. Replace electrical leads. Refer to TM 9-2320-211-20 for procedures.

CHAPTER 4

REMOVAL OF MAJOR COMPONENTS, ACCESSORIES, AND SUBASSEMBLIES

Section I. GENERAL

4-1. Purpose

This chapter provides instructions for general cleaning, preparation of the engine for complete disassembly, and separation of major components, accessories, and subassemblies from the basic engine block at the direct support, general support, and depot levels of skills, tools, and facilities.

4-2. Cleaning

a. *General.* The procedures for cleaning are the same or very similar for many components of the engine. To avoid excessive repetition of instructions, general procedures for cleaning are covered in paragraphs b through f below. Special instructions necessary for individual operations or subassemblies are covered in pertinent paragraphs.

b. *Cleaning Instructions.* Dirt is the worst enemy of precisely machined parts of an engine. The need for cleanliness in working with engine components, therefore, must be thoroughly understood and conscientious effort must be made to exclude all forms of dirt, dust, grit, and other contaminants from the work area, as well as from the items being worked on, inspected, or repaired. The presence of dirt or other foreign materials in the engine or its subassemblies must be considered a serious threat to satisfactory performance, and the cause of many failures and malfunctions which sideline needed equipment and shorten engine life. The following instructions apply to all maintenance and repair operations.

(1) Clean the engine exterior thoroughly, immediately upon receiving it.

(2) Keep hands free of any accumulation of grease which can collect dust, dirt, or grit.

(3) Cover or wrap in plastic or suitable paper all parts which have been cleaned and are not to be used or worked on right away.

(4) Clean machined parts with drycleaning solvent or mineral spirits paint thinner and dry with low-pressure compressed air, or wipe dry with a clean, lint-free cloth.

(5) Blow out passages with clean, dry compressed air until passage is dry.

(6) Clean seals, cables, and flexible hoses with soap and water, and dry thoroughly.

Caution: **Do not allow drycleaning solvent or mineral spirits paint thinner to contact seals, cables, or flexible hoses. These cleaners cause leather, rubber, and some synthetic materials to dry out, rot and lose pliability, rendering them unfit for further service.**

(7) Refer to TM 9-214 for information and instructions on care and maintenance of bearings.

c. *General Precautions in Cleaning.*

(1) Cleaning solvent is flammable and should not be used near an open flame. Fire extinguishers should be provided when these materials are used.

Warning: **When using cleaning solvent, the room or place being used for the cleaning must be well ventilated.**

(2) These cleaners have a drying effect on the skin and if used without gloves may cause cracking, irritation, or inflammation of the skin.

(3) Do not allow cleaning solvent, engine fuels, or lubricants to get on rubber parts or

rubber coverings, as they will deteriorate rubber.

(4) The use of gasoline, benzene (benzol) or diesel fuel oil for cleaning is prohibited.

(5) Do not use caustic solution for cleaning aluminum or aluminum alloy castings or parts.

4-3. Mounting Engine on Overhaul Stand (figs 4-1 and 4-2)

Using adapter brackets (front FSN 4910-996-7257 and rear FSN 4910-996-7256), bolts, lockwashers, and nuts, mount the engine assembly on engine overhaul stand FSN 4910-975-0189, and cradle assembly FSN 4910-795-0198 so that the engine may be rotated to aid in disassembly and assembly operations. The cradle should be positioned so that the weight center of the engine is approximately in line with the shaft of the rotating gearbox, for easiest handling. Start work with the engine in the upright position.

4-4. Draining the Engine

a. *Engine Lubricating Oil.* Refer to LO 9-2320-211-12 for instructions and procedures

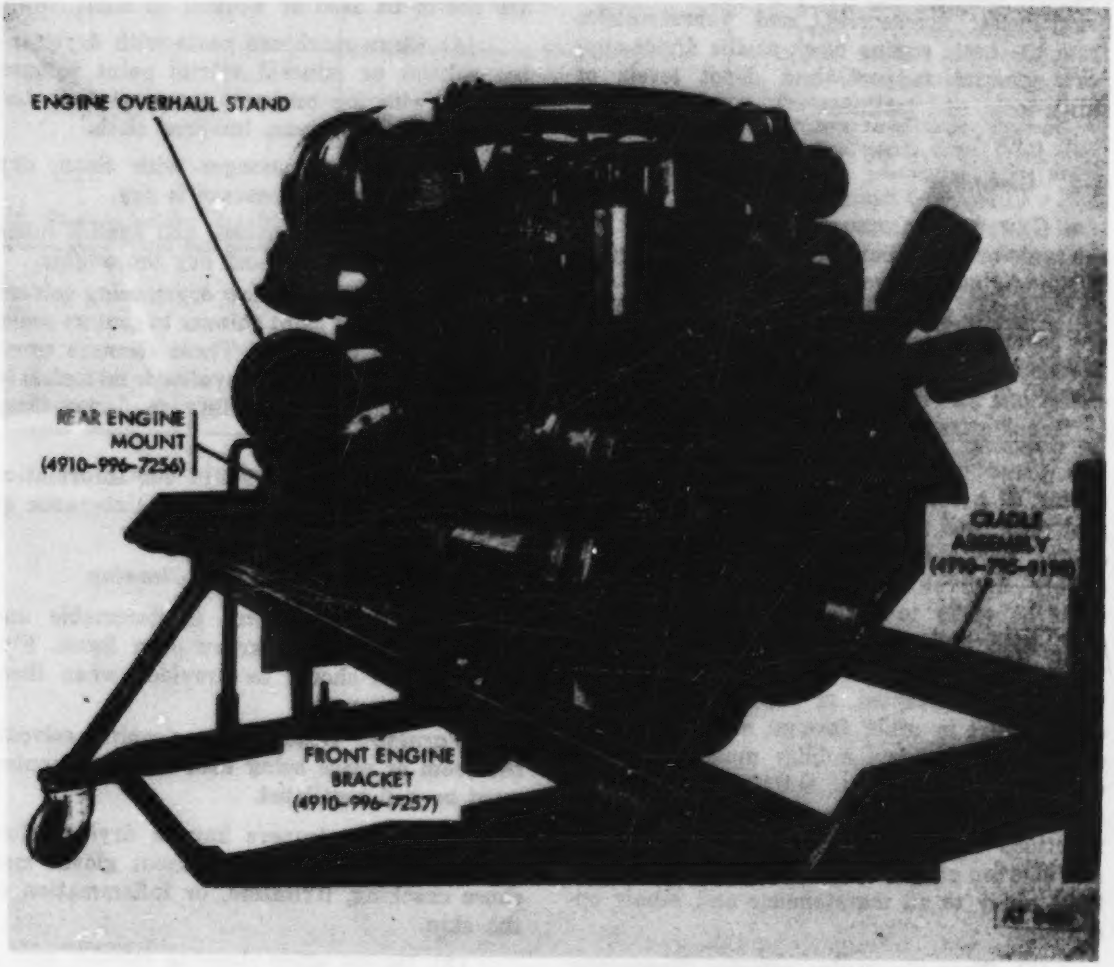

ENGINE OVERHAUL STAND
REAR ENGINE MOUNT (4910-996-7256)
CRADLE ASSEMBLY (4910-795-0198)
FRONT ENGINE BRACKET (4910-996-7257)

Figure 4-1. Engine mounted on overhaul stand—front view.

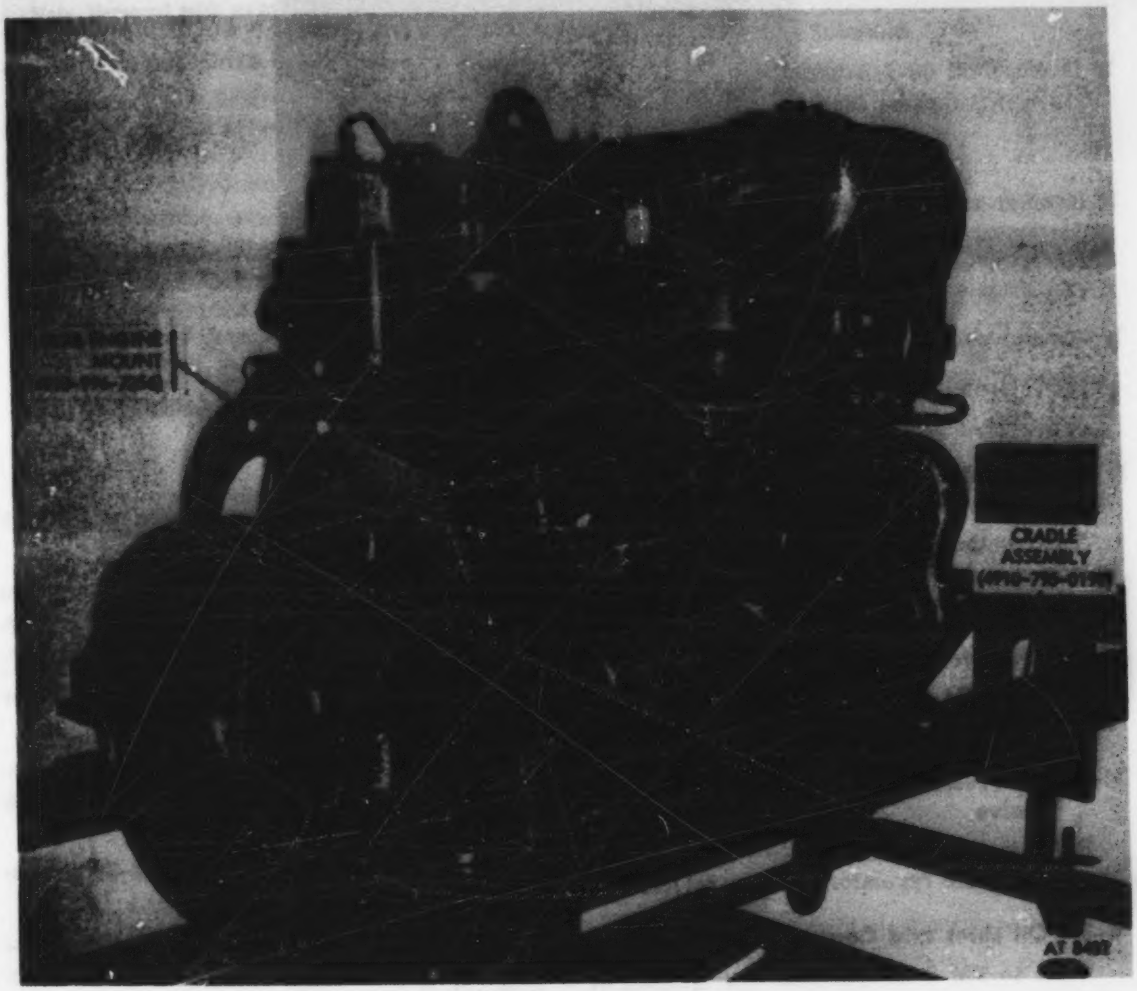


Figure 4-2. Engine mounted on overhaul stand—rear view.

for draining the engine lubricating oil from crankcase and oil filter housing.

b. *Secondary Fuel Filter.* Refer to TM 9-2320-211-20 for instructions and procedures to drain the secondary fuel filter.

c. *Engine Coolant* (*fig. 4-3*). Provide a suitable container under engine, directly under the upper and lower draincocks. Open both draincocks and allow all engine coolant to drain thoroughly. Close both draincocks.

Figure 4–3. Engine block coolant drain cocks.

Section II. REMOVAL OF ENGINE ACCESSORIES

4–5. General

This section covers removal of engine accessories and components normally maintained by the using organization.

4–6. Oil Filter Elements

Refer to TM 9–2320–211–20 for removal of the primary and secondary oil filter elements.

4–7. Oil Pressure Regulator and Control Valve

Refer to TM 9–2320–211–20 for removal of the oil pressure regulator and control valve.

4–8. Oil Lines and Connections

Refer to TM 9–2320–211–20 for removal of oil lines and connections.

4–9. Turbocharger

Refer to TM 9–2320–211–20 for removal of the turbocharger.

4–10. Exhaust Manifold

Refer to TM 9–2320–211–20 for removal of the exhaust manifold.

4–11. Flame Heater Assembly Components

a. *Injector Nozzle and Spark Plug Housing.* Refer to TM 9–2320–211–20 for removal of the flame heater injector nozzle and spark plug housing.

b. *Spark Plug.* Refer to TM 9–2320–211–20 for removal of the flame heater spark plug.

c. *Fuel Lines and Fittings.* Refer to TM 9–2320–211–20 for removal of the flame heater fuel lines and fittings.

d. *Wiring Harness.* Refer to TM 9–2320–211–20 for removal of the flame heater wiring harness.

e. *Coil.* Refer to TM 9–2320–211–20 for removal of the flame heater coil.

f. *Solenoid Valves.* Refer to TM 9–2320–211–20 for removal of the flame heater solenoid valves.

4–12. Intake Manifold

Refer to TM 9–2320–211–20 for removal of the intake manifold.

4–13. Low-Pressure Fuel Lines and Fittings

Refer to TM 9–2320–211–20 for removal of low-pressure fuel lines and fittings.

4–14. Fuel Emergency Shutoff Valve

Refer to TM 9–2320–211–20 for removal of the fuel shutoff valve.

4-15. Secondary Fuel Filter

Refer to TM 9-2320-211-20 for removal of the secondary fuel filter.

Note. Removed with water pump (par. 4-18).

4-16. Fan and Drive Belts

Refer to TM 9-2320-211-20 for removal of the fan and drive belts.

4-17. Cooling System Hoses, Lines, and Fittings

Refer to TM 9-2320-211-20 for removal of the cooling system hoses, lines, and fittings.

4-18. Water Pump

Refer to TM 9-2320-211-20 for removal of the water pump.

4-19. Thermostat

Refer to TM 9-2320-211-20 for removal of the thermostat.

4-20. Water Header

Refer to TM 9-2320-211-20 for removal of the water header.

4-21. Starter and Solenoid

Refer to TM 9-2320-211-20 for removal of the starter and solenoid assembly.

4-22. Generator

Refer to TM 9-2320-211-20 for removal of the generator assembly.

4-23. Air Compressor

Refer to TM 9-2320-211-20 for removal of the air compressor assembly.

4-24. Power Steering Pump

Refer to TM 9-2320-211-20 for removal of the power steering pump.

CHAPTER 5

DISASSEMBLY OF ENGINE

5–1. General

This chapter covers the complete disassembly of the engine.

5–2. Oil Level Dipstick and Tube

a. Refer to figure 5–1. Unscrew and remove oil level dipstick. Remove capscrew and lockwasher securing bracket to cylinder block.

b. Disconnect nut securing oil level tube to oil pan. Remove oil level tube.

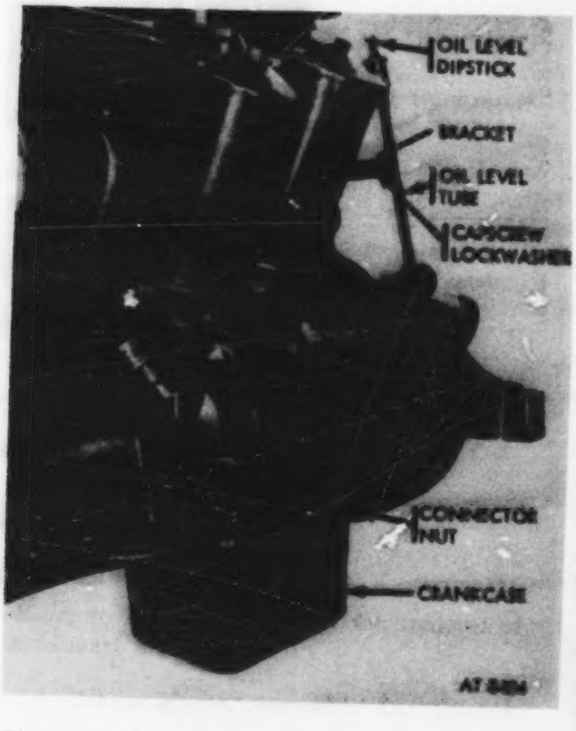

OIL LEVEL DIPSTICK
BRACKET
OIL LEVEL TUBE
CAPSCREW LOCKWASHER
CONNECTOR NUT
CRANKCASE
AT 8404

Figure 5–1. Removing or installing oil level dipstick and tube.

5–3. Oil Cooler Assembly

a. Refer to figure 5–2. Remove four capscrews and lockwashers securing oil inlet line to oil cooler and filter base plate. Remove oil inlet line and two gaskets. Discard gaskets.

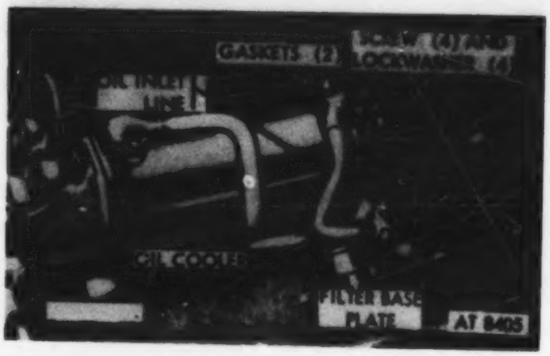

GASKETS (2)
SCREW (4) AND LOCKWASHER (4)
OIL INLET LINE
OIL COOLER
FILTER BASE PLATE
AT 8405

Figure 5–2. Removing or installing oil inlet line.

b. Refer to figure 5–3. Remove the oil pressure sending unit from the oil outlet line. Remove four capscrews and lockwashers securing oil outlet line to oil cooler and oil filter base

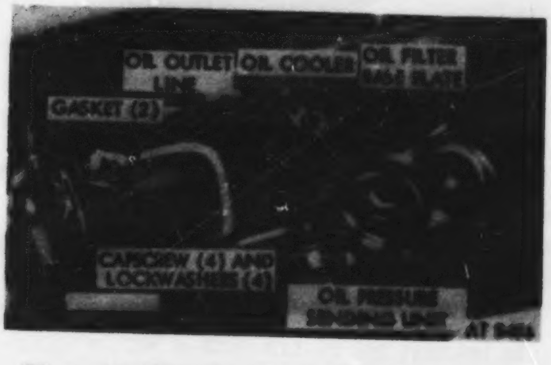

OIL OUTLET LINE
OIL COOLER
OIL FILTER BASE PLATE
GASKET (2)
CAPSCREW (4) AND LOCKWASHERS (4)
OIL PRESSURE SENDING UNIT

Figure 5–3. Removing or installing oil outlet line.

plate. Remove oil outlet line and two gaskets. Discard gaskets.

c. Refer to figure 5–4. Disconnect oil cooler water inlet line and bypass-line from oil cooler housing.

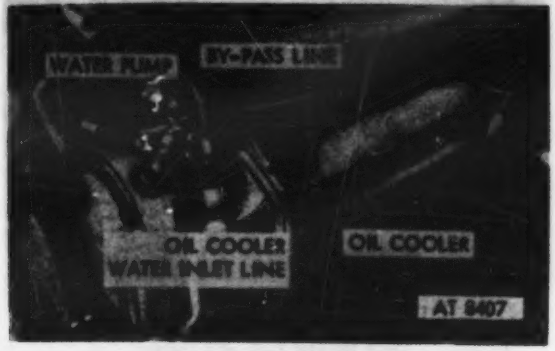

WATER PUMP
BY-PASS LINE
OIL COOLER WATER INLET LINE
OIL COOLER
AT 8407

Figure 5–4. Removing or installing oil cooler water inlet line and bypass line.

d. Refer to figure 5–5. Disconnect oil cooler water inlet line from rear of oil cooler. Remove two capscrews and lockwashers securing oil cooler to mounting bracket.

Note. Reinstall two capscrews and lockwashers in oil cooler assembly after removal from bracket.

e. Remove two capscrews and lockwashers securing water inlet elbow (fig. 1–2) and oil cooler to the water pump. Remove elbow, oil cooler, and two gaskets. Discard gaskets.

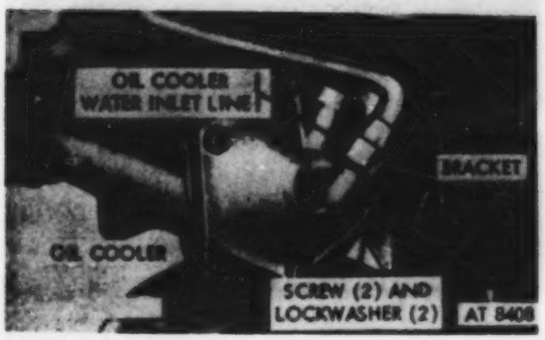

OIL COOLER WATER INLET LINE
BRACKET
OIL COOLER
SCREW (2) AND LOCKWASHER (2)
AT 8408

Figure 5–5. Removing or installing oil cooler assembly.

f. Refer to figure 5–6. Remove three capscrews and lockwashers securing oil cooler rear support bracket to cylinder block. Remove bracket.

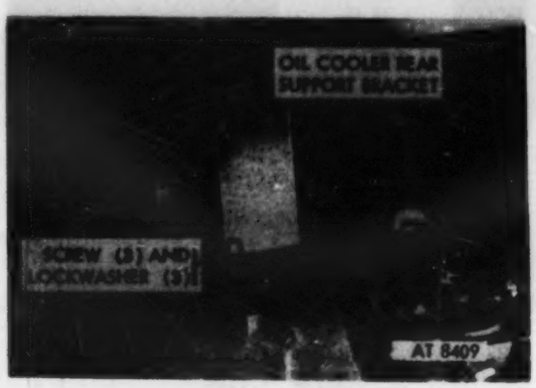

OIL COOLER REAR SUPPORT BRACKET
SCREW (3) AND LOCKWASHER (3)
AT 8409

Figure 5–6. Removing or installing oil cooler rear support bracket.

5–4. Oil Filter Base Plate and Relief Valve Assembly

Refer to figure 5–7. Remove four capscrews and lockwashers securing oil filter base plate and relief valve assembly to cylinder block. Remove base plate and gasket. Discard gasket.

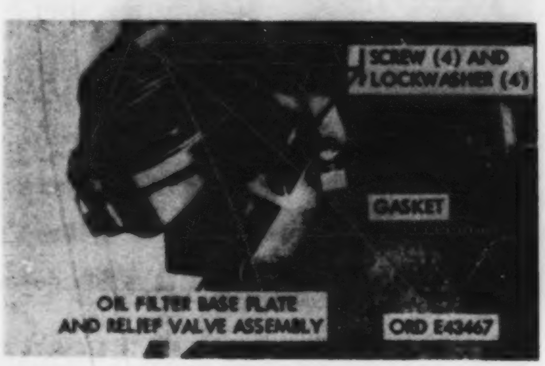

SCREW (4) AND LOCKWASHER (4)
GASKET
OIL FILTER BASE PLATE AND RELIEF VALVE ASSEMBLY
ORD E43467

Figure 5–7. Removing or installing oil filter base plate and relief valve assembly.

5–5. High-Pressure Fuel Lines and Fittings

a. Refer to figure 5–8. Disconnect six high pressure lines from fuel injection pump delivery valves by unscrewing the six tube nuts.

Caution: **Cap fuel delivery valve openings on fuel injection pump with six caps FSN 4910–977–7403 (fig 5–9) to prevent entry of dirt, and damage to the fuel injector assembly.**

b. Refer to figure 5–10. Disconnect and remove three clamps securing high-pressure fuel lines to cylinder block. Disconnect the six

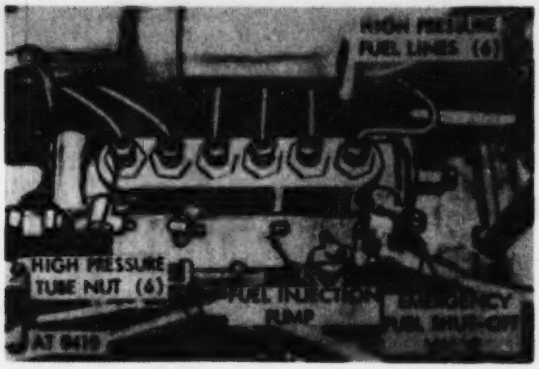

HIGH PRESSURE
FUEL LINES (6)
HIGH PRESSURE
TUBE NUT (6)
FUEL INJECTION
PUMP
EMERGENCY
FUEL SHUT-OFF
AT 8410

Figure 5–8. Removing or installing high-pressure fuel lines and fittings.

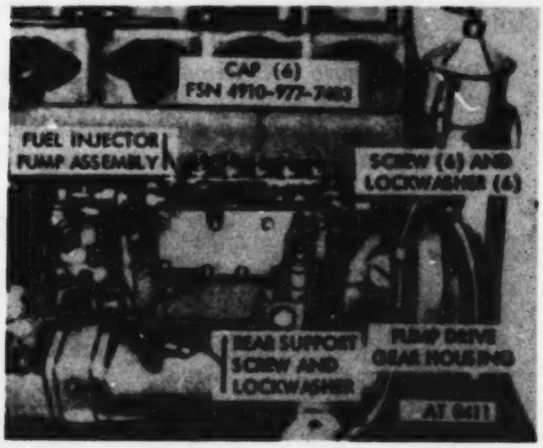

CAP (6)
FSN 4910-977-7483
FUEL INJECTOR
PUMP ASSEMBLY
SCREW (6) AND
LOCKWASHER (6)
REAR SUPPORT
SCREW AND
LOCKWASHER
PUMP DRIVE
GEAR HOUSING
AT 8411

Figure 5–9. Capping fuel injection pump delivery valve openings.

high-pressure lines from injection nozzle assemblies by unscrewing six tube nuts. Remove six high-pressure fuel lines and plug both ends of each high-pressure line using plugs FSN 4730-981-2767 (fig. 5–11).

Note. **The high-pressure fuel lines are seamless, cold-drawn high-tensile steel with identical inside diameters and lengths. Replacement lines must be identical in design to avoid serious impairment of injection characteristics.**

5–6. Fuel Injection Pump Assembly

Refer to figure 5–12. Remove three capscrews and lockwashers securing fuel injection pump drive gear housing to cylinder block. Remove rear support capscrew and lockwasher. Remove fuel injection pump assembly with drive gear housing. Remove and discard gasket.

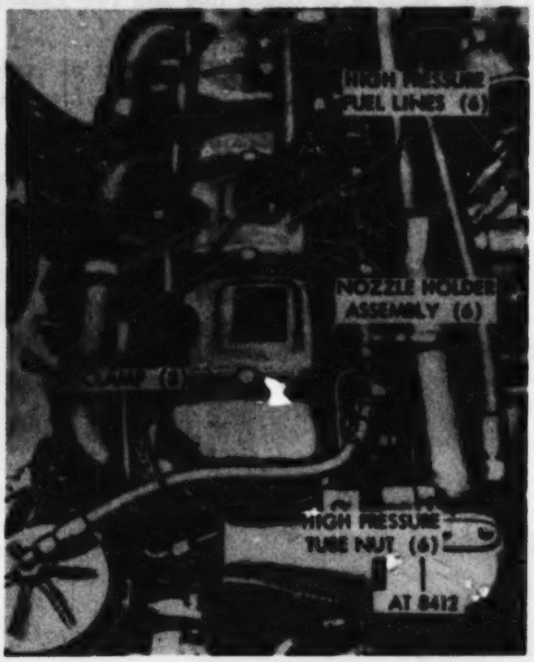

HIGH PRESSURE
FUEL LINES (6)
NOZZLE HOLDER
ASSEMBLY (6)
HIGH PRESSURE
TUBE NUT (6)
AT 8412

Figure 5–10. Removing or installing high-pressure fuel lines and fittings.

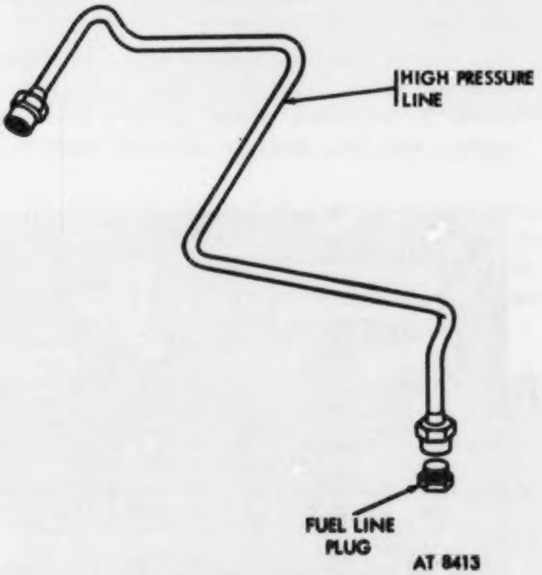

HIGH PRESSURE
LINE
FUEL LINE
PLUG
AT 8413

Figure 5–11. Plugging high-pressure fuel lines.

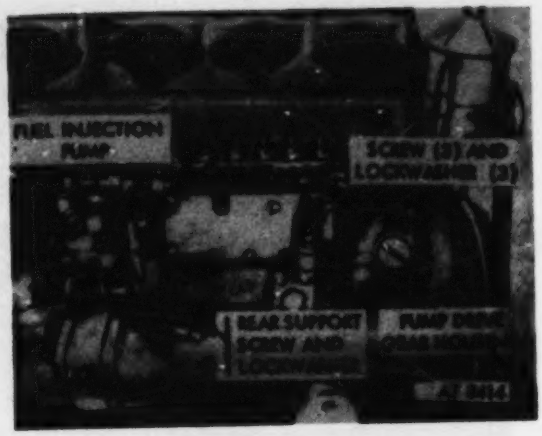

FUEL INJECTION PUMP
SCREW (3) AND LOCKWASHER (3)
REAR SUPPORT SCREW AND LOCKWASHER
PUMP DRIVE GEAR HOUSING
AT 8414

Figure 5-12. Removing or installing fuel injection pump assembly.

5-7. Fuel Injector Nozzle and Holder Assembly

a. Refer to figure 5-13. Disconnect fuel overflow lines from fuel injector nozzle holder assemblies by removing injector nozzle holder top screw. Do not discard gaskets.

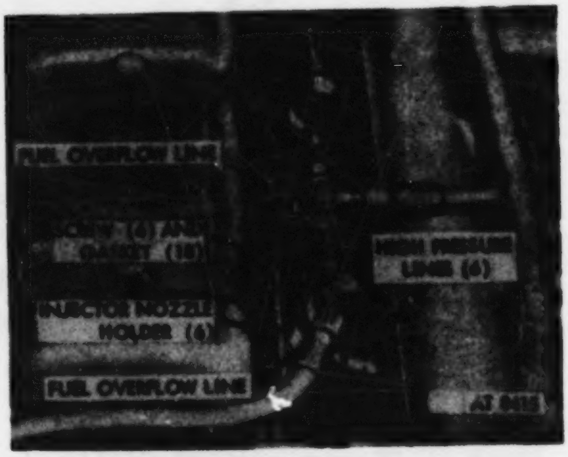

FUEL OVERFLOW LINE
SCREW (6) AND GASKET (18)
HIGH PRESSURE LINE (6)
INJECTOR NOZZLE HOLDER (6)
FUEL OVERFLOW LINE
AT 8415

Figure 5-13. Removing or installing fuel injector nozzle holders (1 of 3).

b. Refer to figure 5-14. Remove two nuts and lockwashers securing each of the six injector nozzle holders to the head assembly.

c. Refer to figure 5-15. Remove fuel injector nozzle holders and gaskets. Discard gaskets.

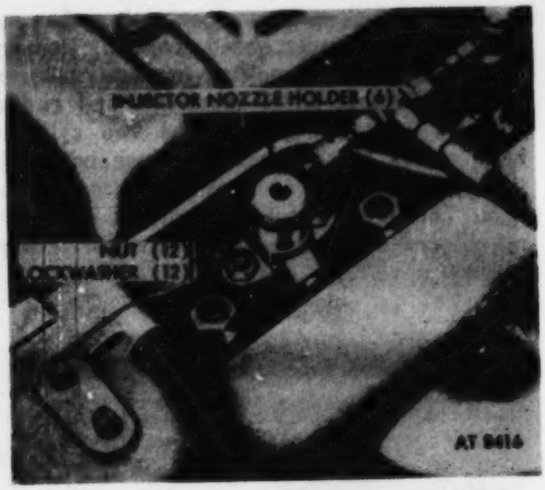

INJECTOR NOZZLE HOLDER (6)
NUT (12)
LOCKWASHER (12)
AT 8416

Figure 5-14. Removing or installing fuel injector nozzle holders (2 of 3).

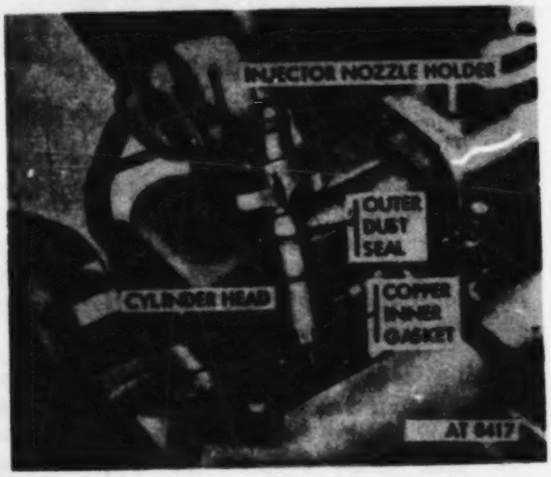

INJECTOR NOZZLE HOLDER
OUTER DUST SEAL
CYLINDER HEAD
COPPER INNER GASKET
AT 8417

Figure 5-15. Removing or installing fuel injector nozzle holders (3 of 3).

5-8. Crankcase Breather Assembly, Cylinder Head Covers, Valve Tappet Covers, Rocker Arm Assemblies, and Cylinder Head Assemblies

Caution: Always remove fuel injector nozzle and holder assemblies prior to removing head assemblies, to prevent damage to nozzle valve tips which protrude beyond the deck surface of the head assemblies.

a. Refer to figure 5-16. Remove four capscrews and lockwashers securing breather assembly to cylinder head covers. Remove breather assembly and two gaskets. Discard gaskets. Remove three capscrews and gasket washers securing each of the two cylinder head covers to the heads. Remove both cylinder head covers and gaskets. Discard gaskets. The oil filler cap is anchored by one cover screw and uses an additional gasket washer.

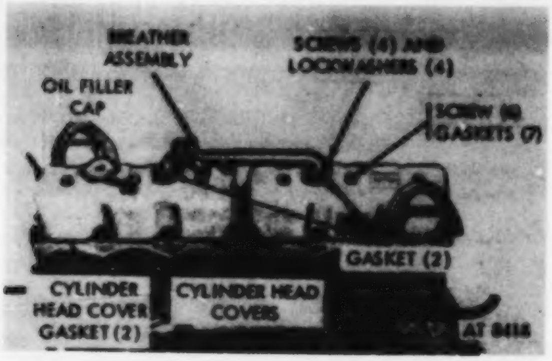

BREATHER ASSEMBLY
SCREWS (4) AND LOCKWASHERS (4)
OIL FILLER CAP
SCREW (6) GASKETS (7)
GASKET (2)
CYLINDER HEAD COVER GASKET (2)
CYLINDER HEAD COVERS
AT 8418

Figure 5-16. Removing or installing cylinder head assemblies.

b. Refer to figure 5-17. Remove 14 capscrews and lockwashers securing two valve tappet covers to cylinder block. Remove three clips, air compressor coolant line, and injection pump oil line. Remove two valve tappet covers and two gaskets. Discard gaskets.

c. Refer to figure 5-18. Loosen rocker arm adjusting screw locknuts and turn adjusting screws to release valve spring tension. Remove three capscrews and three lockwashers securing each of the front and rear rocker arm assemblies to their respective cylinder heads. Remove both rocker arms.

d. Refer to figure 5-19. Remove rocker arm push rods. Remove two capscrews and lockwashers securing each lifting eye to its respective cylinder head. Remove two lifting eyes and four high hexagon nuts which also secure cylinder head. Remove additional hexagon nuts securing each of the head assemblies to the cylinder block. Remove two cylinder heads and gaskets. Discard gaskets.

Note. On engines FSN 2815-980-7092, each of the two cylinder heads is secured by eighteen 9/16-inch studs and nuts. On engines FSN 2815-087-2273 and 2815-045-6865, each cylinder head is secured by twenty 5/8-inch studs and nuts.

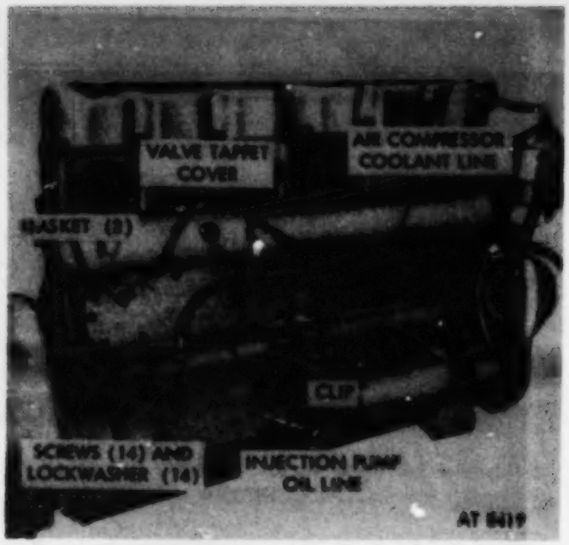

VALVE TAPPET COVER
AIR COMPRESSOR COOLANT LINE
GASKET (2)
CLIP
SCREWS (14) AND LOCKWASHER (14)
INJECTION PUMP OIL LINE
AT 8419

Figure 5-17. Removing or installing cylinder head assemblies.

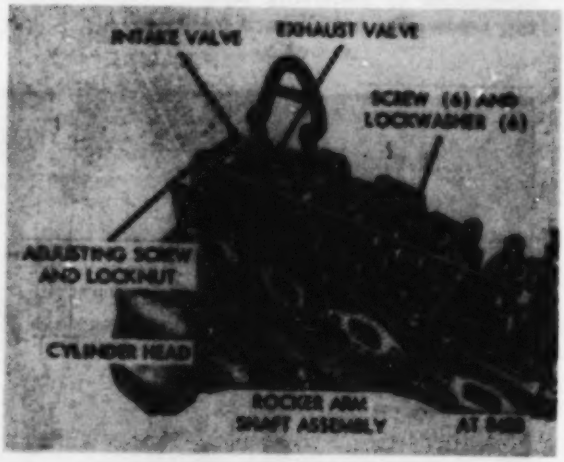

INTAKE VALVE
EXHAUST VALVE
SCREW (6) AND LOCKWASHER (6)
ADJUSTING SCREW AND LOCKNUT
CYLINDER HEAD
ROCKER ARM SHAFT ASSEMBLY
AT 8420

Figure 5-18. Removing or installing cylinder head assemblies.

5-9. Clutch Assembly and Pilot Bearing

a. *Clutch Assembly.*

Warning: **Install three ⅜-16 NC x 2½ capscrews and ⅜ flat washers in pressure plate cover before removing from flywheel. This will**

Figure 5-19. Removing or installing cylinder head assemblies.

prevent any injury from pressure springs (fig. 8-1).

Refer to figure 5-20. Remove 12 capscrews and 12 lockwashers securing clutch pressure plate assembly to flywheel.

b. *Clutch Plate and Disk.* Remove clutch pressure plate assembly and driven clutch disk.

c. *Clutch Pilot Bearing.* Refer to paragraph 6-18.

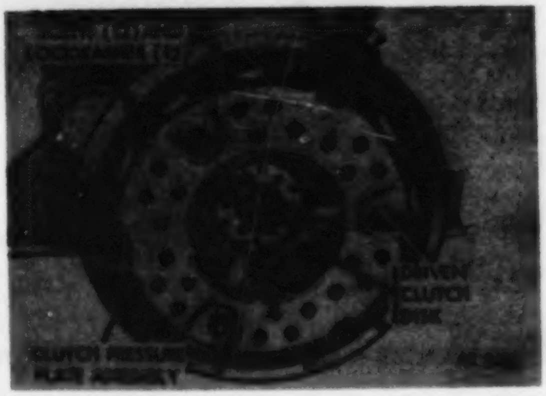


Figure 5-20. Removing or installing clutch assembly

5-10. Flywheel Assembly and Flywheel Housing Assembly

a. *Flywheel Assembly.* Refer to figure 5-21. Remove six cotter pins locking castle nuts to studs. Discard cotter pins. Remove six hexagon nuts securing flywheel. Remove flywheel from crankshaft flange.

COTTER PIN (6)
FLYWHEEL
CASTLE NUT (6)
CLUTCH PILOT BEARING

Figure 5-21. Removing or installing flywheel assembly.

b. *Flywheel Housing Assembly.* Refer to figure 5-22. Cut and remove lockwire securing flywheel mounting capscrews. Discard wire. Remove eight capscrews and eight lockwashers securing flywheel housing to rear face of cylinder block. Remove two capscrews and two lockwashers securing rear of cylinder block to back of flywheel housing. Remove flywheel housing. Remove and discard crankshaft seal.

5-11. Front Engine Mount, Pulley, and Vibration Damper

a. *Front Engine Mount.* Refer to figure 5-23. Remove two capscrews and lockwashers securing upper half of front engine mount. Remove cap, mount, two spacers, and two inserts.

b. *Pulley and Vibration Damper.* Refer to figure 5-24. Remove six capscrews and lockwashers securing pulley and vibration damper to crankshaft hub. Remove pulley and vibration damper.

5-12. Crankcase Assembly

Refer to figure 5-25. Remove two socket-

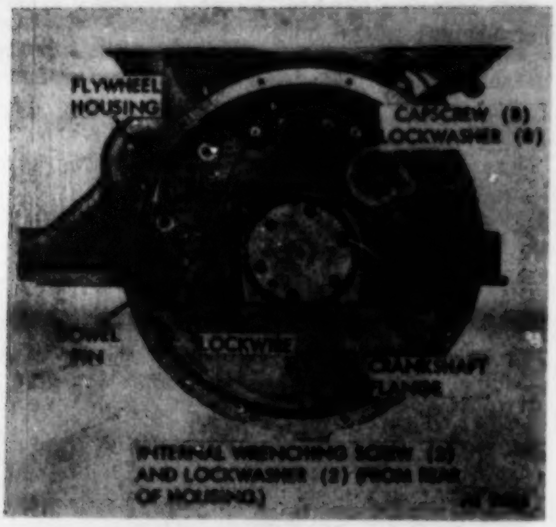

FLYWHEEL HOUSING
CAPSCREW (8)
LOCKWASHER (8)
DOWEL PIN
LOCKWIRE
CRANKSHAFT FLANGE
INTERNAL WRENCHING SCREW (2) AND LOCKWASHER (2) (FROM REAR OF HOUSING)

Figure 5–22. Removing or installing flywheel housing assembly.

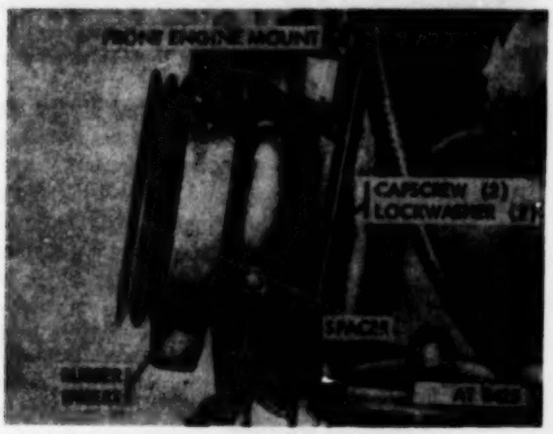

FRONT ENGINE MOUNT
CAPSCREW (2)
LOCKWASHER (2)
SPACER

Figure 5–23. Removing or installing front engine mount.

head screws and lockwashers securing the front of the oil pan to the timing gear cover. Remove 26 capscrews with lockwashers securing oil pan to cylinder block. Remove oil pan and gasket. Discard gasket.

5–13. Oil Pump, Pressure Safety Relief Valve, Oil Pump Pickup Assembly, and Tube Assembly

a. Refer to figure 5–26. Cut and remove lockwire securing oil pump pickup tube capscrews to oil pickup assembly. Discard lockwire. Remove two capscrews securing oil pump pickup tube to oil pickup assembly. Cut and remove lockwire securing bracket to oil pickup assembly capscrews. Remove two capscrews from bracket.

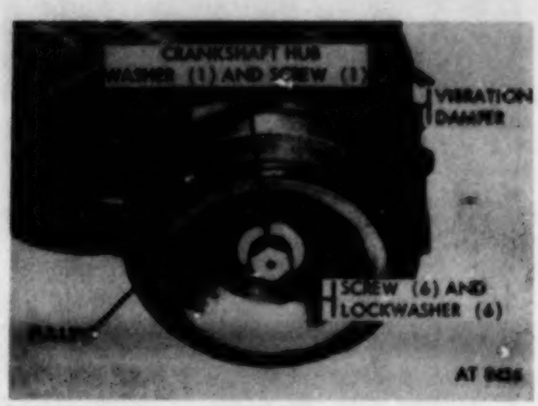

CRANKSHAFT HUB
WASHER (1) AND SCREW (1)
VIBRATION DAMPER
SCREW (6) AND
LOCKWASHER (6)
PULLEY
AT 9426

Figure 5–24. Removing or installing pulley and vibration damper.

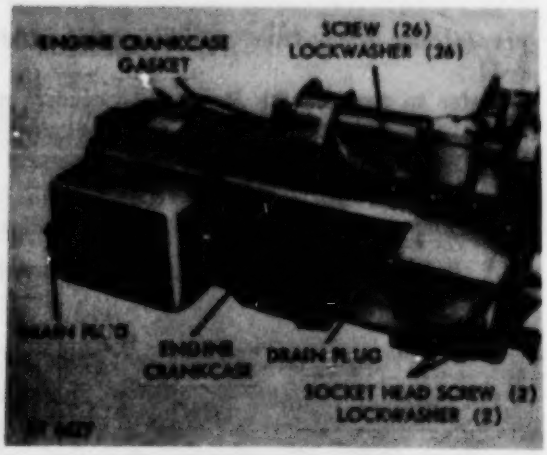

ENGINE CRANKCASE GASKET
SCREW (26)
LOCKWASHER (26)
DRAIN PLUG
ENGINE CRANKCASE
DRAIN PLUG
SOCKET HEAD SCREW (2)
LOCKWASHER (2)

Figure 5–25. Removing or installing crankcase assembly.

b. Refer to figure 5–27. Cut and remove lockwire securing oil pump pickup tube capscrews at oil pump assembly. Remove two capscrews securing oil pump pickup tube to oil pump assembly. Remove bolt, nut, and lockwasher securing oil pump pickup tube and clamp to support bracket. Remove oil pump

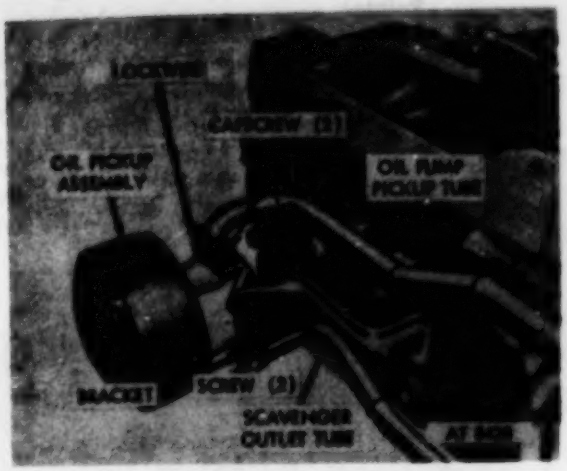

LOCKWIRE
CAPSCREW (2)
OIL PICKUP ASSEMBLY
OIL PUMP PICKUP TUBE
BRACKET
SCREW (2)
SCAVENGER OUTLET TUBE

Figure 5–26. Removing or installing oil pump pickup assembly.

pickup tube and gaskets. Discard gaskets. Cut and remove lockwire securing scavenger pickup tube capscrews. Remove two capscrews securing scavenger pickup tube to oil pump and remove tube and gasket. Discard gasket.

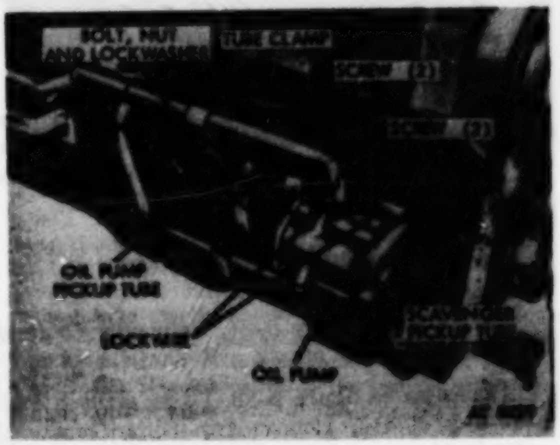

BOLT, NUT AND LOCKWASHER
TUBE CLAMP
SCREW (2)
SCREW (2)
OIL PUMP PICKUP TUBE
LOCKWIRE
SCAVENGER PICKUP TUBE
OIL PUMP

Figure 5–27. Removing or installing oil pump pickup tube and scavenger pickup tube.

c. Refer to figure 5–28. Cut, remove, and discard lockwire, and remove two capscrews securing scavenger outlet tube to oil pump assembly. Remove screw and lockwasher securing support bracket to cylinder block. Cut, remove, and discard lockwire, and remove two capscrews securing oil pump outlet tube to oil pump assembly. Cut, remove, and discard lockwire, and remove two capscrews securing oil pump outlet tube to oil pressure safety relief valve. Remove oil pump outlet tube. Remove and discard gasket and preformed packing.

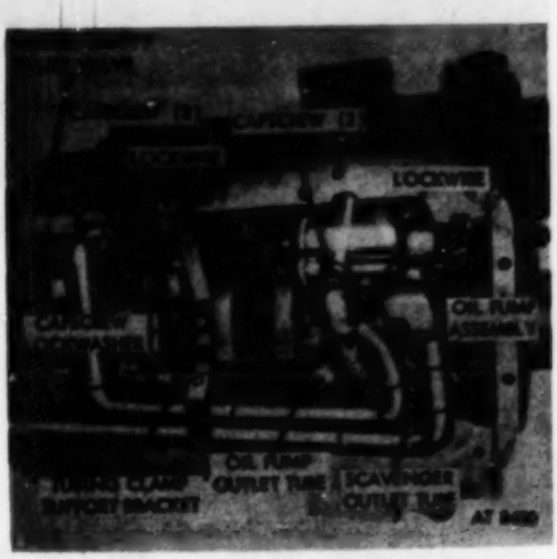

CAPSCREW (2)
CAPSCREW (2)
LOCKWIRE
LOCKWIRE
OIL PUMP ASSEMBLY
CAPSCREW LOCKWASHER
TUBING CLAMP SUPPORT BRACKET
OIL PUMP OUTLET TUBE
SCAVENGER OUTLET TUBE

Figure 5–28. Removing or installing oil pump outlet tube and bracket.

d. Refer to figure 5–29. Remove one capscrew, one hexagon-head nut, and two lockwashers securing oil pump assembly to front main bearing cap. Remove oil pump assembly. Remove two square keys alining oil pump to front main bearing cap.

Note. The front main bearing cap is also secured with the same capscrew and nut which secures the oil pump.

e. Refer to figure 5–30. Remove remaining capscrew securing oil pressure safety relief valve to cylinder block. Remove pressure safety relief valve and gasket. Discard gasket.

Note. One capscrew remove in c above.

f. Refer to figure 5–31. Cut, remove, and discard lockwire securing two bracket capscrews. Remove two capscrews securing oil pickup assembly bracket to main bearing caps. Remove oil pickup assembly and bracket.

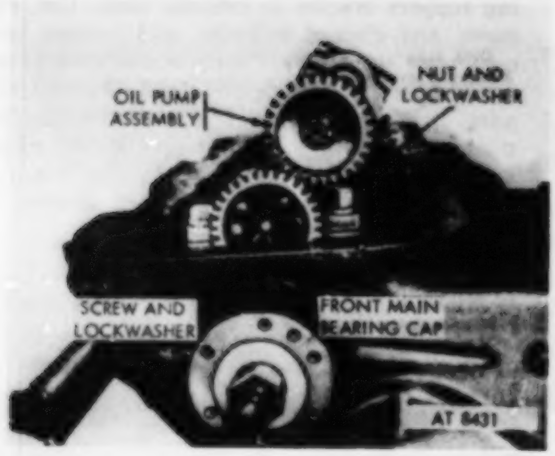

OIL PUMP ASSEMBLY
NUT AND LOCKWASHER
SCREW AND LOCKWASHER
FRONT MAIN BEARING CAP
AT 8431

Figure 5-29. Removing or installing oil pump assembly.

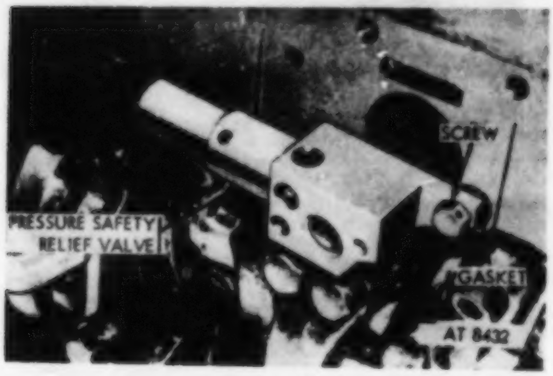

SCREW
PRESSURE SAFETY RELIEF VALVE
GASKET
AT 8432

Figure 5-30. Removing or installing pressure safety relief valve.

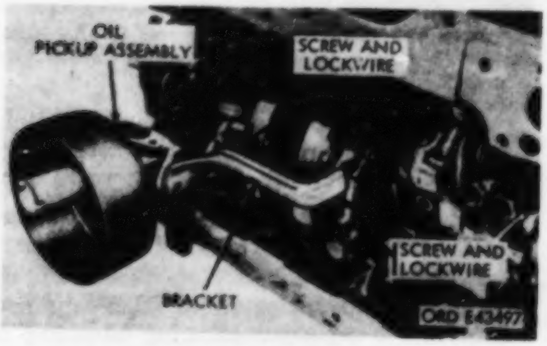

OIL PICKUP ASSEMBLY
SCREW AND LOCKWIRE
SCREW AND LOCKWIRE
BRACKET
ORD E43497

Figure 5-31. Removing or installing oil pump pickup assembly and bracket.

5-14. Timing Gear Cover and Timing Mark Pointer

a. Refer to figure 5-32. Remove three capscrews and three lockwashers securing timing mark pointer and fuel line clamp. Remove timing mark pointer and fuel line clamp. Remove bolt and washer securing crankshaft hub to crankshaft. Using a suitable puller, remove crankshaft hub from crankshaft. Remove key.

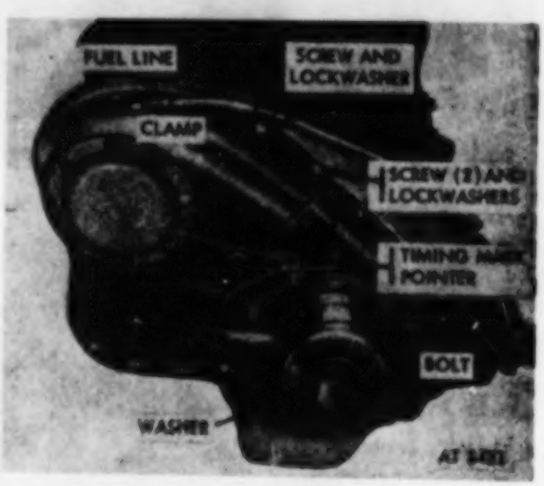

FUEL LINE
SCREW AND LOCKWASHER
CLAMP
SCREW (2) AND LOCKWASHERS
TIMING MARK POINTER
BOLT
WASHER
AT

Figure 5-32. Removing or installing timing mark pointer.

b. Refer to figure 5-33. Remove remaining 15 capscrews and lockwashers securing timing gear cover assembly to cylinder block. Remove cover and gasket. Discard gasket.

5-15. Piston and Connecting Rod Assemblies

a. Refer to figure 5-34. Remove carbon deposits from top of six cylinder sleeves.

b. Refer to figure 5-35. Using wrench FSN 4910-977-7417, remove two bolts from each connecting rod being removed. Remove connecting rod cap and bearing. Remove piston and connecting rod assemblies through top of cylinder block.

Note. Keep bearings with their respective caps and rods. The connecting rod caps and connecting rods are marked with matched numbers (1 through 6) to ensure the proper installation in respective cylinders. Numbers are marked on the camshaft side of the connecting

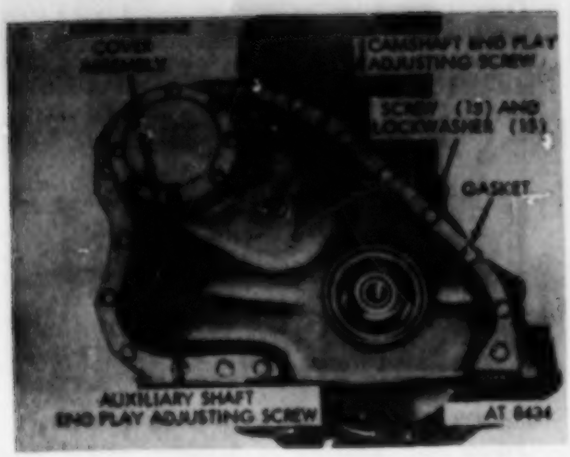

COVER ASSEMBLY
CAMSHAFT END PLAY ADJUSTING SCREW
SCREW (15) AND LOCKWASHER (15)
GASKET
AUXILIARY SHAFT END PLAY ADJUSTING SCREW
AT 8434

Figure 5–33. Removing or installing timing gear cover.

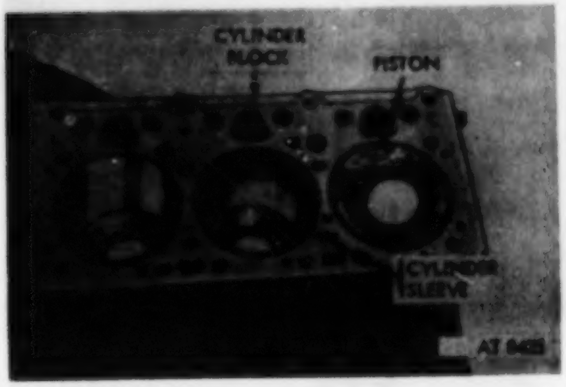


Figure 5–34. Removing or installing piston assemblies.

rods. Exercise care in removal of piston and connecting rods. Be certain connecting rods do not scratch or score cylinder sleeves during removal. Turn crankshaft as necessary to get the piston near top center to allow connecting rods to pass through cylinder sleeves. It may be necessary to tap connecting rod with a hammer handle or nylon dowel, to force piston and rings out of cylinder sleeve.

5–16. Main Bearing Caps, Main Bearings, and Crankshaft

Note. The main bearing caps are marked 1 through 7 (front to rear) to identify their locations. Identifying numbers also appear on the cylinder block assembly opposite each web. The caps are not interchangeable with each other and must be returned to their original positions during installation. The front main bearing cap can be identified by keyways to position the oil pump assembly. All caps are retained by two screws except the center and rear ones which require four screws. The center main bearing cap is identified by its width and thrust washer pins in each side.

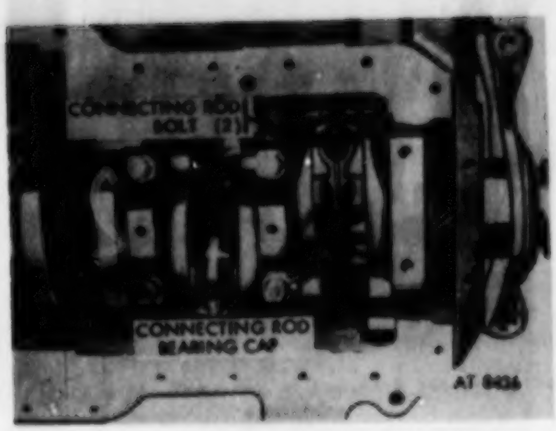


Figure 5–35. Removing or installing connecting rod assemblies.

a. Refer to figure 5–36. The front main bearing cap is removed with the oil pump (par. 5–14d). Remove the remaining 16 main bearing capscrews and lockwashers securing the main bearing caps to cylinder block assembly.

Note. Keep bearing halves with their respective caps. Check to see if bearings are properly identified by cylinder number. If not, use grease pencil and mark bearing tab in case the bearings are to be re-used. The center bearing and thrust washers should be marked with grease pencil so they can be installed in the same position as removed.

b. Refer to figure 5–37. Check timing gears to be sure all markings are visible.

c. Refer to figure 5–38. Attach a suitable sling to each end of crankshaft. Using a suitable hoist, carefully lift and remove crankshaft from cylinder block. Remove main bearing upper halves from cylinder block and mark for identification, in case bearings are to be re-used.

5–17. Timing Gears

a. Refer to figure 5–39. Remove nut securing injection pump-driven gear to shaft. Thread two ¼–28 NF x 3 full thread screws into hub, remove driven gear and hub from shaft.

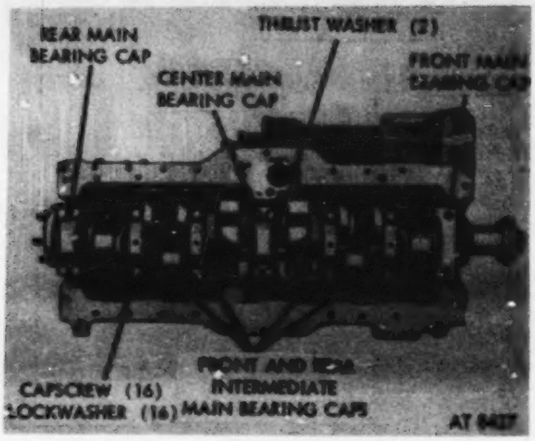

REAR MAIN
BEARING CAP
THRUST WASHER (2)
CENTER MAIN
BEARING CAP
FRONT MAIN
BEARING CAP
CAPSCREW (16)
LOCKWASHER (16)
FRONT AND REAR
INTERMEDIATE
MAIN BEARING CAPS
AT 8437

Figure 5–36. Removing or installing main bearing caps and main bearings.

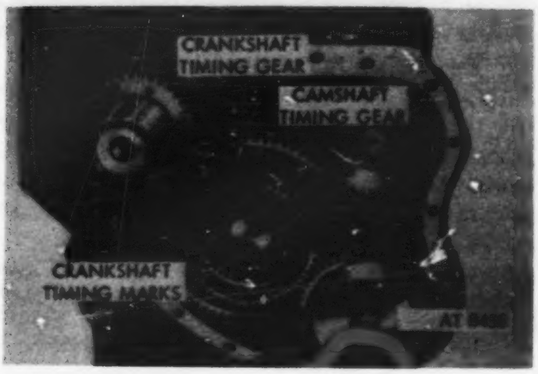

CRANKSHAFT
TIMING GEAR
CAMSHAFT
TIMING GEAR
CRANKSHAFT
TIMING MARKS
AT 8438

Figure 5–37. Location of timing gear marks.

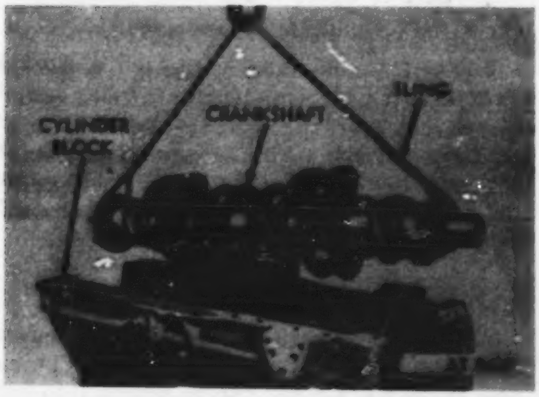

CYLINDER
BLOCK
CRANKSHAFT
SLING

Figure 5–38. Removing or installing crankshaft.

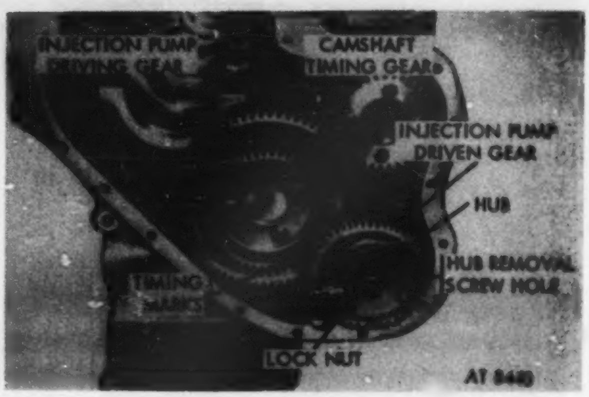

INJECTION PUMP
DRIVING GEAR
CAMSHAFT
TIMING GEAR
INJECTION PUMP
DRIVEN GEAR
HUB
HUB REMOVAL
SCREW HOLE
TIMING
MARKS
LOCK NUT
AT 8440

Figure 5–39. Removing or installing injection pump driven gear and hub.

b. Refer to figure 5–40. Remove four capscrews and lockwashers securing auxiliary drive gear to hub. Remove auxiliary drive gear from hub.

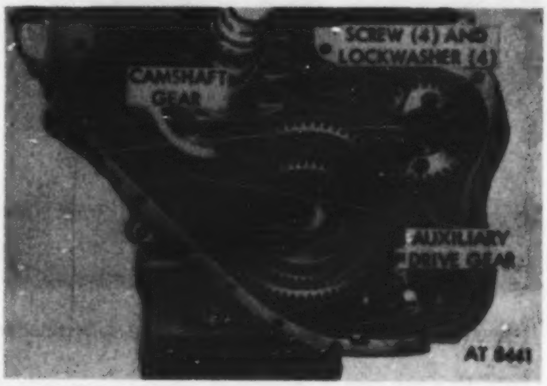

SCREW (4) AND
LOCKWASHER (4)
CAMSHAFT
GEAR
AUXILIARY
DRIVE GEAR
AT 8441

Figure 5–40. Removing or installing auxiliary drive gear.

c. Refer to figure 5–41. Remove four capscrews and four lockwashers securing injector pump driving gear to camshaft gear. Remove injection pump drive gear. Remove key from camshaft gear face.

5–18. Camshaft Assembly and Valve Tappets

a. *Camshaft Assembly.* Refer to figure 5–42. Remove camshaft assembly from cylinder block by guiding it carefully from the inside of the cylinder block and pulling from the front. Use

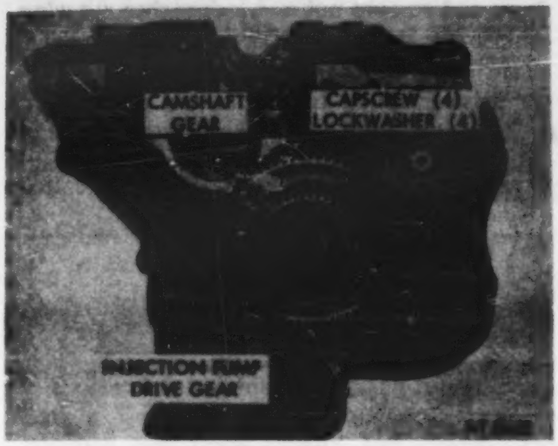

CAMSHAFT GEAR
CAPSCREW (4)
LOCKWASHER (4)
INJECTION PUMP DRIVE GEAR

Figure 5–41. Removing or installing injection pump drive gear.

INJECTION PUMP DRIVE GEAR

Figure 5–42. Removing or installing camshaft assembly.

care not to damage camshaft bearings and camshaft lobes.

b. *Valve Tappets.* Refer to figure 5–43. Remove 12 valve tappets from cylinder block.

5–19. Auxiliary Drive, Injection Pump Drive, and Tachometer Drive Assemblies

a. Refer to figure 5–44. Remove three capscrews and lockwashers securing injection pump drive shaft assembly to cylinder block. Remove shaft assembly from cylinder block.

b. Refer to figure 5–45. Remove two cap-

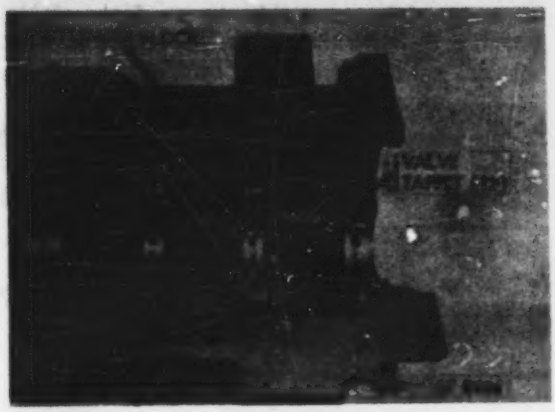

VALVE TAPPET

Figure 5–43. Removing or installing valve tappets.

CYLINDER BLOCK
INJECTION PUMP DRIVE SHAFT ASSEMBLY

Figure 5–44. Removing or installing injection pump drive shaft assembly.

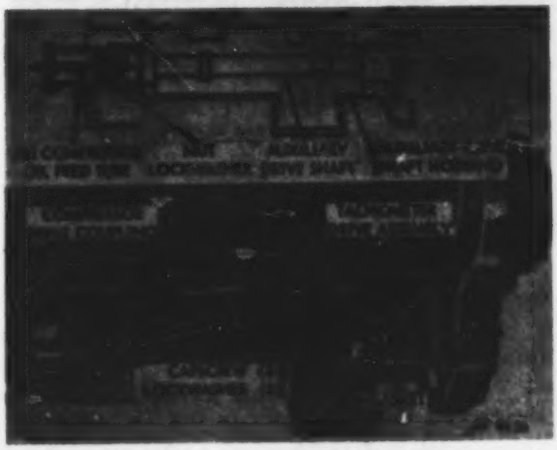

NUT
LOCKWASHER
AUXILIARY DRIVE SHAFT
SHAFT HOUSING

Figure 5–45. Removing or installing auxiliary drive, and tachometer drive assemblies.

screws and two lockwashers securing tachometer drive assembly to auxiliary drive housing. Remove tachometer drive and gasket. Discard gasket. Remove air compressor oil feed tube if necessary.

Note. Oil tube may be removed by tapping with 5/16–18NC tap and installing 5/16–18NC capscrew to pull upon. Do not score outside diameter if tube is to be used again.

c. Bend tangs of external-tooth lockwasher down and remove nut and lockwasher securing compressor drive coupling to auxiliary drive shaft. Using a suitable puller, remove compressor drive coupling from auxiliary drive shaft. Remove auxiliary drive shaft from front of cylinder block, being careful not to damage bearing surfaces or gear teeth.

CHAPTER 6

REPAIR OR REBUILD OF SUBASSEMBLIES

Section I. GENERAL CLEANING, INSPECTION AND REPAIR PROCEDURES

6–1. General

a. The cleaning, inspection, and repair coverage in this section is limited to normal or common conditions usually encountered. The mechanic is expected to exercise his good judgment or consult a higher authority when or if unusual conditions or difficulties are encountered during cleaning, inspection, and repair operations.

b. When handling parts susceptible to rust, whether new or used, they are to be lightly coated with preservative oil immediately after cleaning, inspection, or repair, and prior to their assembly. Oiling the parts helps to prevent rust and facilitates assembly operations.

6–2. Cleaning Engine Before Disassembly

a. Remove grease or oil from all parts of the engine, using a stiff brush and cleaning solvent.

b. After the engine is clean, rinse with water and dry thoroughly. Apply a thin coat of preservative oil to exposed polished metal surfaces to prevent rusting.

6–3. Cleaning Component Parts After Disassembly

a. Clean all components of the engine except ball bearings and roller bearings, in accordance with instructions given in TM 9–208–1.

b. Clean and prepare for use all ball bearings and roller bearings in accordance with instructions given in TM 9–214.

c. Remove all gaskets and gasket residue from mating surfaces, using a putty knife or suitable scraper. Be careful to avoid scratching or gouging the surface metal when removing gaskets.

d. Clean all parts that have undergone repair operations.

e. Protect all parts from accumulation of dust and grit after cleaning. This can be accomplished by covering or wrapping in plastic or suitable paper.

6–4. Inspection

a. *General.* Components of the engine must be thoroughly examined to determine if they are in a serviceable condition. During inspection and repair of components, refer to Rebuild Standards, in each section, to ascertain correct dimensions and fits of various parts. When parts are not within allowable tolerances given in the "Wear limits" column, repair or replace as required. Where no limits are indicated in the "Wear limits" column, parts should be replaced when worn beyond limits given in "Size and fit of new parts" column. General inspection and repair procedures are listed in the following paragraphs.

b. *Castings.* Inspect all castings for cracks, giving particular attention to areas adjacent to studs and pipe plugs. Look for local discoloration on mating surfaces as they often indicate persistent oil, fuel, or exhaust leaks. Test all mating flanges with a straightedge or surface plate. Remove all burrs or raised metal with a fine mill file. Replace any part if cracks are evident or mating surface is warped.

c. *Studs, Screws, and Nuts.* Inspect all studs, screws, and nuts for damaged threads. Minor damage to threads may be corrected with a standard thread chaser and/or tap. If severe damage is evident, replace the affected part. Bent or loose studs or studs showing any evidence of stretch must be replaced. Refer to paragraph 6–5d for information on stud removal and installation.

d. *Tapped Holes.* Inspect and check all tapped holes for damaged threads. Clean up threads with an old tap so threads are not cut oversize.

6–5. Repair Procedures

a. All repairs must be of workmanlike quality. Makeshift or temporary repairs are not permitted except in extreme emergencies.

b. The principal purpose of repairs is to salvage parts which would otherwise be scrapped. The decision as to whether a part is to be repaired or not rests upon the following factors:

(1) *Cost of the repair.* Compare the cost of the repair with that of a replacement part. If the repair cost factor does not favor the repair, the part should be discarded.

(2) *Availability of replacement parts.* If service parts are not available or are in short supply, every effort should be made to salvage as many parts as possible, disregarding any of the other governing factors.

c. Upon completion of any repairs, clean and protect parts in accordance with paragraph 6–3.

d. Inspect and remove studs if necessary, in the following manner:

(1) *Inspection.* Inspect all studs for damaged threads. Correct minor damage with a standard thread chaser. Studs with stripped threads, bent or loose studs, or studs showing any evidence of stretching must be replaced.

(2) *Removing studs.* Back studs out slowly to avoid heating and possible seizure. If studs are broken off to short to be removed with a wrench, drill and extract with a suitable remover. If broken studs cannot be removed by this method, weld a piece of bar stock or a nut to stud and remove with a wrench.

Caution: Use this method with care to avoid damage to casting.

(3) *Replacing studs.* Clean out tapped holes, using an old tap if threads appear to be in good condition.

Caution: A new tap may cut oversize.

Section II. REBUILD OF CYLINDER BLOCK ASSEMBLY

6–6. General

a. This section covers disassembly, cleaning, inspection, repair, and assembly of the engine cylinder block assembly and its related parts. The related parts are those that are machined with the cylinder block and were removed during engine disassembly.

b. During the rebuilding of the engine and engine components, replacement parts will be needed. The federal stock number is required when ordering replacement parts. The engine serial number and federal stock number are located on top of the auxiliary drive housing (fig. 6–1).

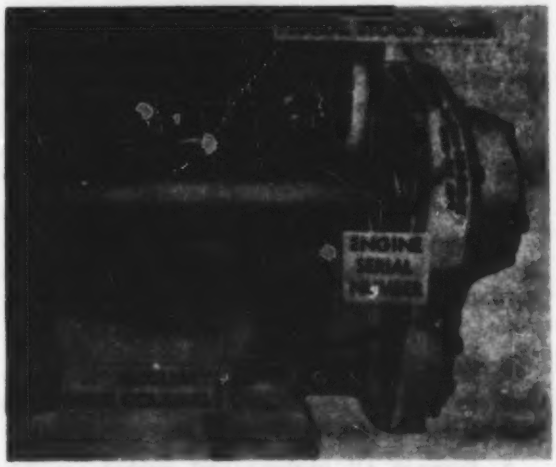


Figure 6–1. Location of engine identification number.

6–7. Disassembly

a. Refer to figure 6–2. Remove cylinder block oil gallery plugs.

Figure 6–2. Removing or installing cylinder block oil gallery plugs.

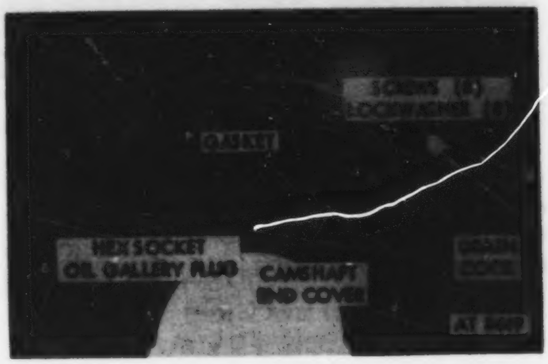


Figure 6–3. Removing or installing camshaft end cover and oil gallery plug.

WATER JACKET END COVER
CAPSCREW (2)
GASKET
DRAIN COCK

Figure 6–4. Removing or installing water jacket end cover, draincocks, and corehole plugs.

b. Refer to figure 6–3. Remove eight capscrews and eight lockwashers securing camshaft end cover to block. Remove camshaft end cover and gasket. Discard gasket. Remove hexagon-socket oil gallery plug.

c. Refer to figure 6–4. Remove two capscrews and lockwashers securing water jacket end cover to block. Remove end cover and gasket. Discard gasket. Remove draincocks and any corehole plugs necessary to perform cleaning procedures adequately.

Note. When necessary plugs, covers, and fittings (if applicable) have been removed from cylinder block, it must be thoroughly cleaned in accordance with procedures contained in paragraph 6–8.

6–8. Cleaning

a. *Cylinder Block.* Clean out all drilled oil passage holes in the cylinder block with a round rod or wire. Apply steam or compressed air to thoroughly clean. Use water at high pressure to clean water jacket. Thoroughly clean main bearing and camshaft bearing bores to facilitate checking for extremely small cracks and fractures.

b. *Cylinder Sleeves.* Remove carbon deposit from cylinder sleeves with carbon-cleaning solvent. Clean the sleeves with dry-cleaning solvent or mineral spirits paint thinner.

6–9. Inspection

a. *Cylinder Block.* Examine cylinder block for extremely small cracks and fractures. Check cylinder block top deck for distortion, using straightedge (par. 6–11). Examine all machined surfaces for scores or burrs. Replace assembly when cylinder block or any machined part related to the cylinder block is found unserviceable. Main bearing caps are machined with the cylinder block and must never be replaced individually.

b. *Miscellaneous Metal Components.*

(1) Inspect all studs, screws, nuts, and tapped holes, as outlined in paragraph 6–4.

(2) Inspect cylinder block plugs for evidence of coolant leakage. Mark areas for repair which show evidence of coolant leaks (par. 6–10).

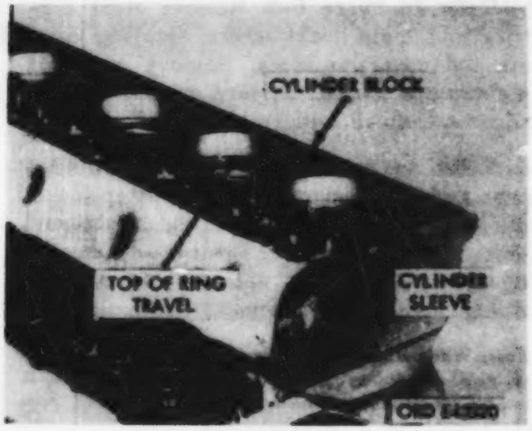


Figure 6–5. Cylinder sleeve inspection.

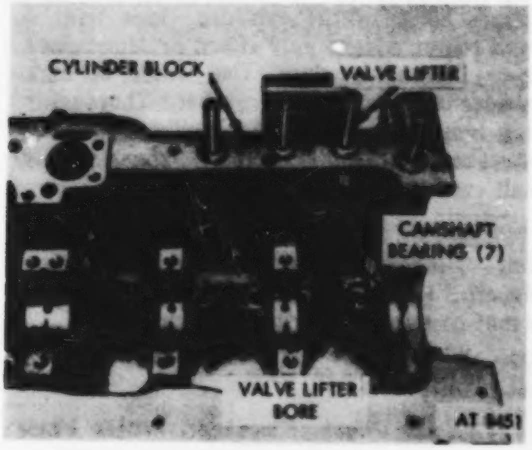


Figure 6–6. Valve lifter, lifter bore, and camshaft bearing inspection.

c. *Cylinder Sleeves* (*fig. 6–5*). Check against limits specified in repair and rebuild standards (par. 6–11) in the following manner:

(1) Take two measurements of cylinder sleeve just below top of ring travel. Measure diameter parallel to and at right angle (90°) to crankshaft centerline. Average the two measurements.

(2) Take similar measurements at bottom of ring travel. Average these two measurements.

Note Top bore average must not exceed bottom bore average by more than 0.002 inch. Two measurements taken 90 degrees apart must compare within 0.002 inch, or sleeve must be considered as being out-of-round and must be replaced.

d. *Valve Lifters, Lifter Bores, and Camshaft Bearings* (*fig. 6–6*).

(1) *Valve lifters.* Inspect valve lifters for scuffing, discoloration, scratches, and evidence of wear. Replace valve lifters that do not conform to repair and rebuild standards (par. 6–11).

(2) *Valve lifter bores.* Check valve lifter bores against those limits specified in the repair and rebuild standards (par. 6–11) in following manner:

(a) Check valve lifter bores in cylinder block for scratches, nicks, and burrs.

(b) Replace the cylinder block when bore is out-of-round, or does not conform to the repair and rebuild standards (par. 6–11).

(3) *Camshaft bearings.*

(a) Inspect camshaft bearings for pitting, galling, burrs, nicks, and cracks.

(b) Check for discoloration which indicates overheating.

(c) Check bearing diameter for wear against those limits specified in the repair and rebuild standards (par. 6–11). Bearings number 1 through 6 have a larger inside diameter than bearing number 7.

e. *Main Bearings and Bearing Bores* (*figs. 6–7 and 6–8*).

(1) Check main bearing half for secure fit in respective casting bore or mating bearing cap, and for evidence of heating which

LOWER THRUST BEARING HALVES (2)
LOWER BEARING HALVES (7)

Figure 6–7. Main bearing caps and bearing inspection.

may be indicated by discoloration. Use only serviceable bearings for main bearing bore check.

(2) Spread a thin coat of Prussian blue over steel backs of upper and lower main bearing halves, and install in original location in cylinder block and bearing caps.

(3) Install bearing caps with bearing halves in their proper location in cylinder block and tighten to 150 pound-foot torque. Check inside diameter of main bearings against limits specified in repair and rebuild standards (par. 6–11).

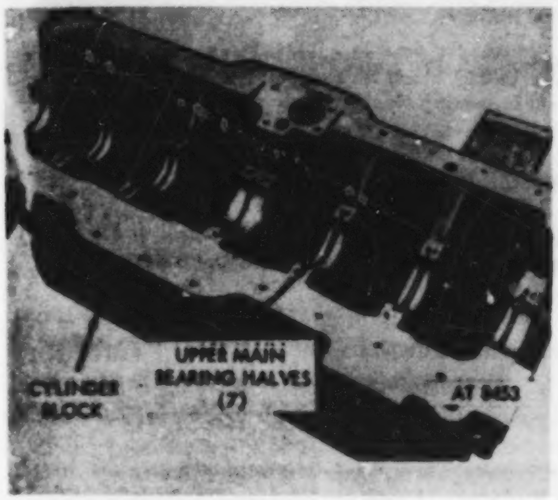


Figure 6–8. Main bearing bore and bearing inspection.

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

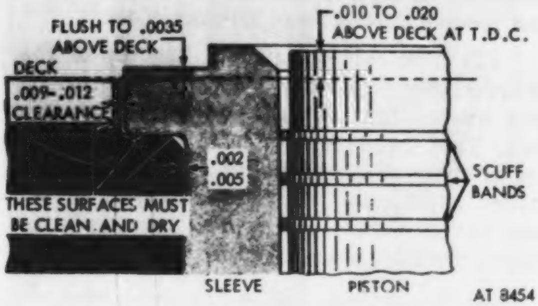

FLUSH TO .0035 ABOVE DECK
.010 TO .020 ABOVE DECK AT T.D.C.
DECK
.009–.012 CLEARANCE
.002
.005
SCUFF BANDS
THESE SURFACES MUST BE CLEAN AND DRY
SLEEVE
PISTON
AT 8454

Figure 6–9. Fitting new cylinder sleeves to cylinder block.

(4) Remove main bearing caps and bearing halves and check the contact surface as indicated by Prussian blue transfer. Replace bearing halves that do not make 75 percent contact with bearing bores.

(5) Inspect machined surfaces of main bearing caps for nicks, burrs, or raised metal.

Note. After main bearings have been checked, remove bearing caps and bearing halves from cylinder block. Keep bearings with respective bearing caps.

f. *Auxiliary Shaft Bearings.* Inspect auxiliary shaft bearings for pitting, galling, burrs, nicks, and cracks. Check bearing diameters against those limits specified in repair and rebuild standards (par. 6–11).

6–10. Repair

a. *Cylinder Block.* Repair cylinder block and main bearing caps having nicks, burrs, and raised metal surfaces, as outlined in paragraph 6–5. The main bearing caps are line-bored with the cylinder block, and replacement of any one part will necessitate replacement of the entire cylinder block assembly.

b. *Miscellaneous Metal Components.*

(1) Repair all studs, screws, nuts and tapped holes, as outlined in paragraph 6–5.

(2) Replace cylinder block plugs that show evidence of coolant leakage.

c. *Cylinder Sleeves.* Replace cylinder sleeves that do not meet requirements specified in repair and rebuild standards (par. 6–11).

(1) *Removal of cylinder sleeves.* When necessary to replace sleeves, use suitable tools and remove sleeves from cylinder block.

(2) *New cylinder sleeves.* The top of the cylinder sleeve flange must be between .0005 inch below the deck to .0035 inch above the deck. This measurement is attained through use of shims that are placed (as required for proper adjustment) in the cylinder liner recess. Invert the liner and with the flange in recess, check level with deck. See figure 6-9.

Note. Engines with the five ring piston must use Parco lubrited sleeves. Engines with four ring piston use plain sleeves.

(3) *Installation of cylinder sleeves.*

(a) Remove all traces of oil and dirt from cylinder bores, with drycleaning solvent. Shrink sleeves to facilitate installation in cylinder bore by submerging them in container of dry ice and cleaning solvent for 25 minutes. Insert sleeves into cylinder bores quickly to prevent seizure.

Caution: **Using air hose, blow any foreign material from cylinder sleeve seat to prevent incomplete seating. Clean seat just prior to final seating of sleeve.**

(b) When sleeves enter ½ to ⅜ of cylinder bore, drive down to final seating place, using a wooden block.

d. *Valve Lifter and Lifter Bore.* Remove slight discoloration from valve lifter, using crocus cloth soaked in mineral spirits paint thinner. Replace valve lifter when scored, or not within limits specified in repair and rebuild standards (par. 6-11).

e. *Camshaft Bearing Replacement.* Replace damaged, loose, or worn camshaft bearings that are not within limits specified in repair and rebuild standards (par. 6-11).

(1) *Removal of camshaft bearings.* Mark location of drilled holes in camshaft bearings with chalk on web of cylinder block. These marks can be used as a guide to aline oil holes when installing new bearings. Use camshaft and auxiliary shaft bearing remover and replacer kit 11644695 to remove cam bearings from cylinder block.

(a) *No. 1 bearing.* Position guide plug 11644678 in No. 3 camshaft bearing, and remover 11644675-1 in No. 1 bearing. Assemble driver 11644674 and 19-inch drive bar 11644680. Slide bar through remover and guide plug until driver butts against remover. Use soft hammer and drive bearing from cylinder block.

(b) *No. 2 bearing.* Insert remover 11644675-1 in No. 1 bearing to act as a guide. Insert remover 11644676-1 in No. 2 bearing. Assemble 19-inch drive bar 11644680 and driver 1164474. Slide bar through remover 11644675-1 until it rests in seat of remover 11644676-1. Use soft hammer and drive out bearing.

Note. Drive bar 11644680 and drive bar extension 11644679 may be assembled to provide a 43-inch bar necessary for No. 3 through No. 7 camshaft bearings.

(c) *No. 3 through 6 bearings.* Remove bearing in a manner similar to No. 2 bearing, adding 24-inch drive bar extension 11644679, when necessary. Move guide plug 11644678 up to bearing next to one being removed each time.

(d) *No. 7 bearing.* Remove same as No. 6 bearing, except use remover 11644672-2.

(2) *Installation of camshaft bearings.* Apply a light coating of oil on outside diameter of new camshaft bearing. Be sure oil hole in bearing is alined with chalk mark on cylinder block. Use camshaft and auxiliary shaft remover and replacer kit and install cam bearing in cylinder block.

Note. Coat outside surface with OE-30 oil before installation.

(a) No. 1 bearing. Position bearing so oil slots mate with oil passages in cylinder block. Using same removers as replacers, and guide plug and driver assembly as used above, drive bearing flush with face of cylinder.

(b) No. 2 bearing. Position bearing so oil slots mate with oil passages in cylinder block. Use same removers, drive bar and extension as used above and drive bearing into cylinder block.

(c) No. 3 through 6 bearings. Replace bearings in a manner similar to No. 2 bearing, adding drive bar extension 11644679, when necessary.

(d) No. 7 bearing. Replace same as No. 6 bearing, above, except use replacer 11644672-2.

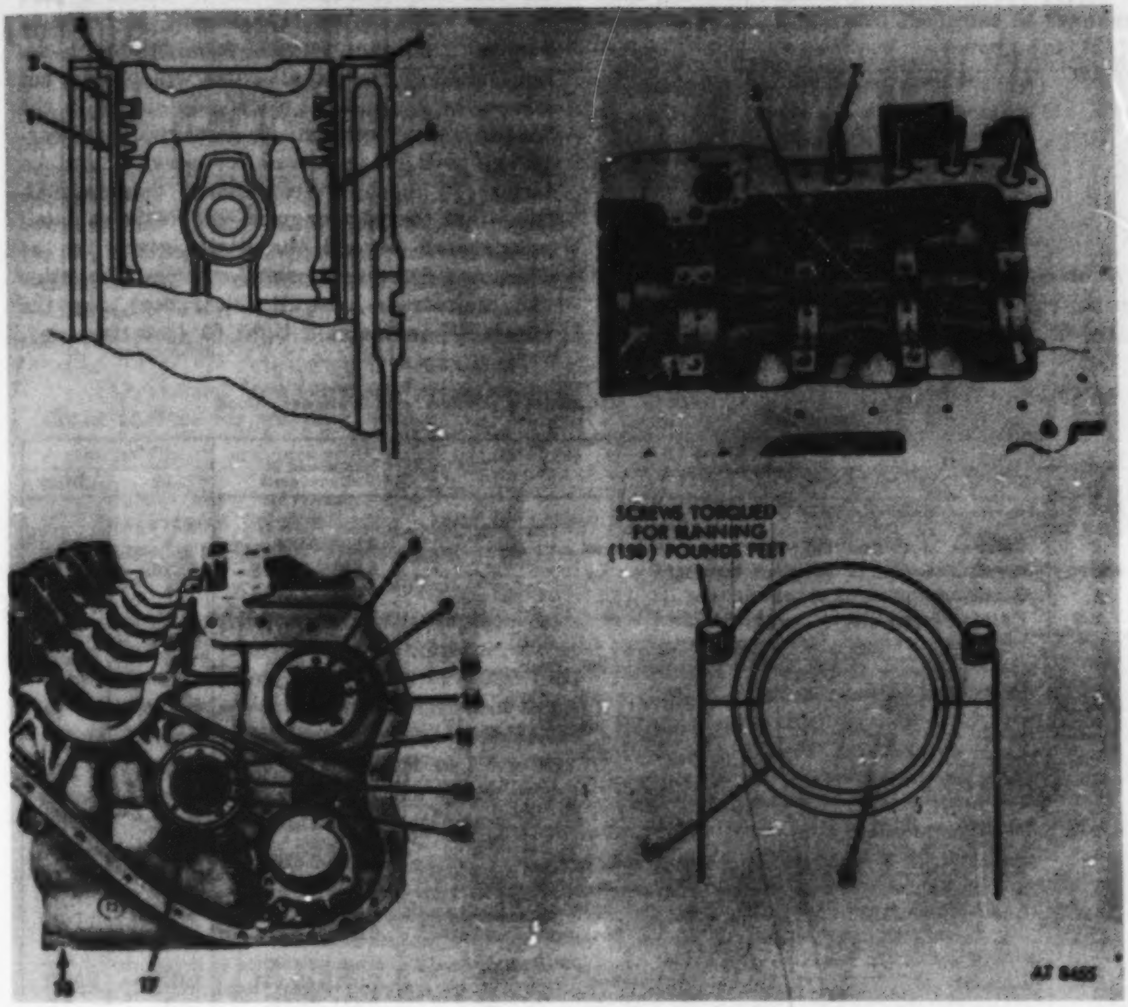


Figure 6–10. Points of measurement and inspection for cylinders and cylinder block.

Note. Replacement camshaft bearings are furnished to size and do not need machining after installation.

f. *Main Bearings and Bearing Bore.*

(1) No repairs are authorized for the main bearing halves. If bearing halves are found to be unserviceable (par. 6–11), they must be replaced with new ones.

(2) Repair cylinder block as outlined in paragraph 6–5. Replacement of any main bearing cap necessitates replacement of entire cylinder block.

g. *Auxiliary Shaft Bearings.* Replace auxiliary shaft bearings that do not meet limits specified in repair and rebuild standards (par. 6–11).

(1) Insert removers into bearings, remover 11644675–3 from the front and remover 11644675–2 from the rear. Slide 19-inch drive bar 11644680 and drive bar extension 11644679 assembly into removers, direction depending upon which bearing is to be removed. Hold driver tight to remover and drive out with a soft hammer.

(2) Install new bearings in the same manner as camshaft bearing No. 1 is installed ((2) (a) above).

Note. After rebuild of cylinder block, remove all dirt, dust, and abrasives prior to reassembly of engine.

6–11. Repair and Rebuild Standards for Cylinder Block

The repair and rebuild standards contained in table 4 and shown on figure 6–10, give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits that indicate that point to which a part may be worn before replacement, in order to receive maximum service with minimum replacement. Normally, all parts which have not been worn beyond the dimension shown in the "Wear limits" column, or damaged from corrosion, will be approved for service. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond the limits given in the "Size and fit of new parts" column. The letter "L" indicates a loose fit (clearance), and the letter "T" indicates a tight fit (interference).

Table 4. Repair and Rebuild Standards—Cylinders and Cylinder Block

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	CYLINDER BLOCK AND CYLINDER SLEEVES			
4	Cylinder block deck deflection under each head	0.000–0.003	*	*
2	Inside diameter of cylinder block bore	5.0935–5.0945	5.0965	*
1	Outside diameter of cylinder sleeve	5.0945–5.0955	*	*
1–2	Fit of cylinder sleeve in cylinder block bore	0.001T–0.002T	*	*
5	Inside diameter of cylinder sleeve	4.875–4.877	4.879	*
3	Sleeve shoulder extension above cylinder block deck	0.000–0.003	*	*
18	Cylinder block deck flatness	0.002 in 36"	*	*
	VALVE LIFTER AND LIFTER BORE			
6	Inside diameter of cylinder block lifter bore	0.6865–0.6890	*	*
7	Outside diameter of valve lifter	0.6855–0.6860	*	*
6–7	Fit of valve lifter in cylinder block bore	0.0005–0.0025	*	*
	CAMSHAFT AND CAMSHAFT BEARINGS			
11	Inside diameter of bearing bore for all bearings	2.623–2.624	*	*
12	Free outside diameter of bearings for numbers 1 through 6	2.6265–2.6285	*	*
12	Free outside diameter of bearing number 7	2.626–2.627	*	*
11–12	Fit of camshaft bearing in bore for bearings, numbers 1 through 6.	0.001–0.004	0.005	0.005
11–12	Fit of camshaft bearing for bearing number 7	0.0015–0.0035	0.0045	0.0045
13	Inside diameter of camshaft bearings numbers 1 through 6	2.441–2.443	*	*
17	Thickness of camshaft thrust washer	.186–.187	*	*
13	Inside diameter of camshaft bearing number 7	2.2535–2.2540	*	*
	Note. Inside diameter of replacement camshaft bearings must not be gaged until they are installed in cylinder block bores.			
	MAIN BEARINGS AND BEARING BORE			
14	Inside diameter of bearing bore in cylinder block	4.251–4.252	*	*
15	Inside diameter of main bearings at proper torque tightness	4.001–4.003	*	*
	AUXILIARY SHAFT AND AUXILIARY SHAFT BEARINGS			
8	Inside diameter of front bearing bore in housing	2.311–2.312	*	*
8	Inside diameter of rear bearing bore in housing	2.249–2.2501	*	*
9	Free outside diameter of front bearing	2.314–2.315	*	*
9	Free outside diameter of rear bearing	2.252–2.253	*	*
8–9	Fit of front and rear auxiliary shaft bearings in bore	0.002T–0.004T	*	*
10	Inside diameter of front auxiliary shaft bearing	2.0635–2.0645	*	*
10	Inside diameter of rear auxiliary shaft bearing	2.0005–2.0010	*	*
	Note. Inside diameter of replacement auxiliary shaft bearings must not be gaged until they are installed in housing bore.			
16	Thickness of auxiliary shaft thrust washer	.186–.187	*	*

Section III. REPAIR OF FLYWHEEL ASSEMBLY

6–12. General

This section contains cleaning, inspection, and repair of the flywheel assembly.

6–13. Cleaning, Inspection, Repair and Replacement

a. *Cleaning.* Clean flywheel thoroughly with mineral spirits paint thinner or drycleaning solvent.

b. *Inspection.*

(1) Inspect face for grooving or scuffing. Check surface for warping, with straightedge.

(2) Check starter ring gear for broken or worn teeth.

(3) Inspect clutch pilot bearing for roughness in rollers or looseness in bore (refer to fig. 6–12).

c. *Clutch Surface Repair.* If inspection indicates the need, it is permissible to machine the flywheel surface and remove up to 0.020 inch of friction surface stock. Stamp depth of stock removal from clutch face on crankshaft flange on flywheel to prevent removal of stock beyond 0.020-inch limitation in the event that a second resurfacing must be performed at a later date.

Note. When machining flywheel to provide flat friction surface for clutch facing, a corresponding amount of stock must be removed from rear edge of flywheel (to which clutch is bolted) to maintain proper flywheel depth. Distance from clutch pressure plate flywheel mounting surface to flywheel clutch friction surface must not exceed or be less than 1.755 inch after resurfacing. Static-balance the flywheel after resurfacing, to within 0.5 inch-ounce.

d. *Flywheel Ring Gear Replacement.*

(1) If inspection indicates necessity of replacing flywheel ring gear, remove ring gear by placing flywheel on a solid even surface. Cut ring gear loose with a suitable tool, using caution not to damage ring surface on flywheel.

(2) Remove all nicks and burrs from ring surface of flywheel.

(3) Uniformly heat new flywheel ring gear until it is a faint straw color (400° to 450° F). Install ring gear quickly on flywheel, with chamfered edge of gear teeth away from clutch side of flywheel.

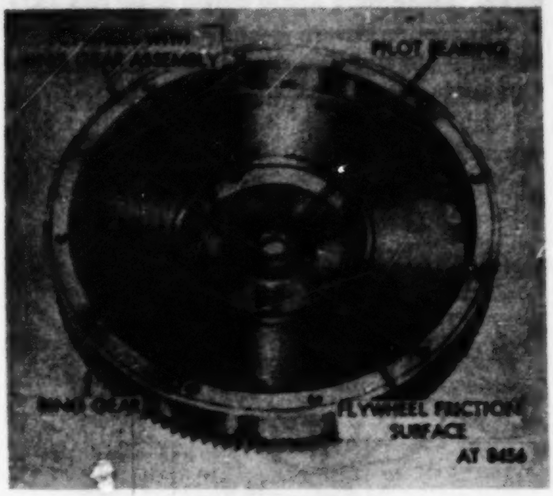


Figure 6–11. Flywheel assembly inspection points.

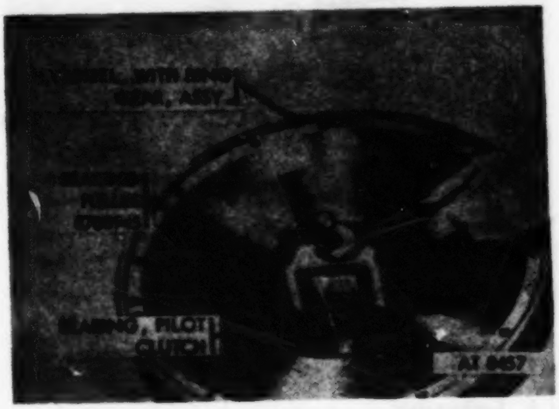


Figure 6–12. Removing clutch pilot bearing.

Caution: Do not heat metal of ring gear red-hot, as metal molecular structure will be changed.

e. *Clutch Pilot Bearing Replacement.*

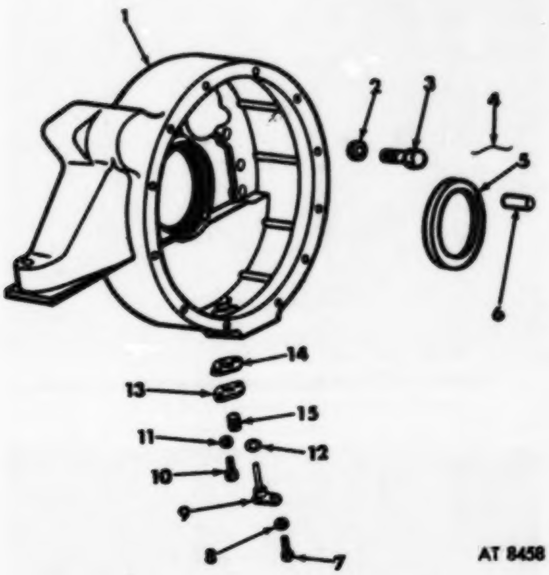
(1) If inspection of clutch pilot bearing indicates the need for replacement, use puller 8708945 and remove bearing (fig. 6–12).

(2) Press in new pilot bearing flush with flywheel mounting surface, using suitable replacer.

Section IV. REPAIR OF FLYWHEEL HOUSING ASSEMBLY

6–14. General

This section covers cleaning, inspection, and repair of the flywheel housing. For components and parts identification, refer to figure 6–13.



1	Flywheel housing	9	Timing indicator
2	Plain washer (housing to block)	10	Capscrew (timing cover)
3	Capscrew (housing to block)	11	Lockwasher
4	Lockwire	12	Seal (flywheel timing indicator)
5	Seal (flywheel housing to crankshaft)	13	Cover (timing inspection)
6	Dowel (flywheel alinement)	14	Gasket (timing inspection cover)
7	Capscrew (timing indicator)	15	Plug (timing inspection cover)
8	Lockwasher		

Figure 6–13. Flywheel housing assembly—exploded view.

6–15. Cleaning and Inspection

a. *Cleaning.* Thoroughly clean flywheel housing as outlined in paragraph 6–3. Clean oil seal with hot water and soap.

Caution: **Do not allow drycleaning solvent or mineral spirits paint thinner to come in contact with seal. These cleaners cause synthetic oil seal material to dry out, rot, and lose pliability.**

b. *Inspection.* Inspect flywheel housing as outlined in paragraph 6–4.

6–16. Disassembly and Repair of Flywheel Housing (fig 6–13)

a. *Disassembly.*

(1) *Oil seal* (*5*). Remove and discard.

(2) *Alinement dowel.* Using a suitable drift and arbor press, press two dowels (6) from flywheel housing if they pulled from the block. Replace dowels in block.

(3) *Timing indicator.* Remove capscrew (7) and lockwasher (8) securing timing indicator (9) to flywheel housing (1). Remove timing indicator (9) and seal (12) from flywheel housing.

(4) *Timing inspection cover.* Remove two capscrews (10) and two lockwashers (11) securing timing inspection cover (13) and gasket (14) to flywheel housing (1). Remove timing inspection cover (13) and gasket (14) from flywheel housing (1). Remove plug (15) from timing inspection cover (13).

b. *Repair.* Repair flywheel housing as outlined in paragraph 6–5, using figure 6–13 for identification of component parts.

Note. Replace flywheel housing when oil seal bore is excessively nicked, burred, or warped.

6–17. Assembly of Flywheel Housing

Reassemble flywheel housing in reverse of disassembly, using new oil seal (5), gasket (14), and seal (12).

Section V. REPAIR OF CONNECTING ROD AND PISTON ASSEMBLIES

6–18. General

Note. The five ring piston uses two oil control rings, and the four ring piston uses only one. The bottom skirt ring is omitted.

This section covers the disassembly, cleaning, inspection, repair, and assembly of the pistons, rings, piston pins, and connecting rods. Refer to figure 6–14 for components and parts identification.

12
10
11
AT 8459

1 Piston compressing rings (Nos. 1, 2, and 3)
2 Piston oil control rings (Nos. 4 and 5)
3 Piston oil control ring equalizer springs (Nos. 4 and 5)
4 Piston pin retaining snapring (two required)
5 Piston pin
6 Piston
7 Connecting rod bushing
8 Connecting rod
9 Connecting rod bearing halves (two required)
10 Connecting rod cap
11 Connecting rod bolt (two required)
12 Connecting rod assembly

Figure 6-14. Connecting rod and piston assembly—exploded view.

6–19. Disassembly

Note. The key numbers in parentheses refer to figure 6-14. Mark pistons, connecting rods, connecting rod caps, and bearing halves so that they can be installed in their original location.

a. Remove three compression rings (1), two oil control rings (2), and two equalizer springs (3) from piston (6).

b. Remove two piston pin retaining snaprings (4), and drive out piston pin (5). Separate piston (6) and connecting rod assembly (12) and place piston pin in piston from which it was removed.

c. Remove connecting rod bearing cap (10) and slide out connecting rod bearing halves (9).

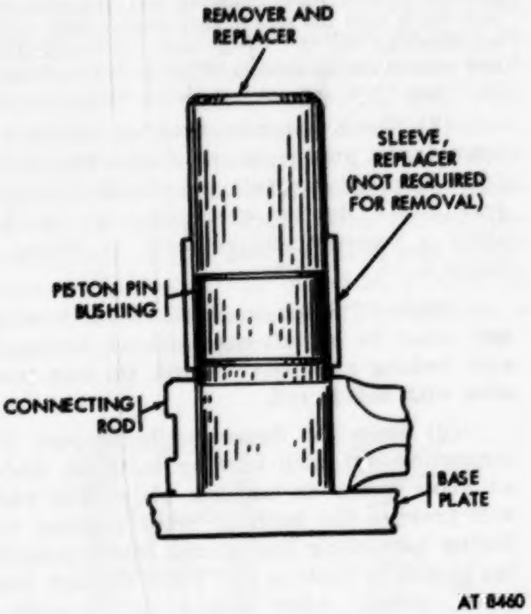

REMOVER AND REPLACER
SLEEVE, REPLACER (NOT REQUIRED FOR REMOVAL)
PISTON PIN BUSHING
CONNECTING ROD
BASE PLATE
AT 8460

Figure 6-15. Removing or installing connecting rod bushing.

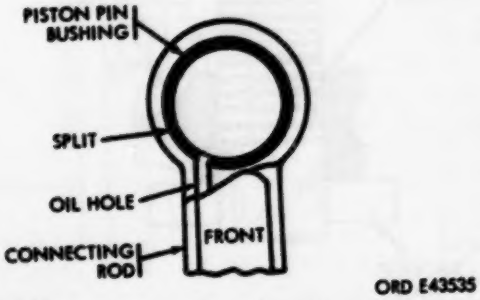

PISTON PIN BUSHING
SPLIT
OIL HOLE
FRONT
CONNECTING ROD
ORD E43535

Figure 6-16. Connecting rod bushing installation position.

6–20. Inspection and Repair

a. *Connecting Rods.*

(1) Check connecting rod alinement using suitable fixture. Bent rods must be replaced.

Note. Connecting rods are factory machined so that all rods do not vary more than 1/4 ounce in total weight, and each end does not vary more than 1/8 ounce in weight. When replacing rods, use only those rods which have the vendor part number with a number following the "P". "P-2" rods are standard, but may be replaced by either a "P-1" or "P-3" providing "P-1" and "P-3" rods are not used in the same engine.

(2) Check piston bushing for scoring and wear. Insert piston pin and check clearance to limits specified in repair and rebuild standards (par. 6–22). Replace worn piston pin bushing using a remover and replacer as shown in figure 6–15.

Caution: **Refer to figure 6–16. Bushing split must be on left-hand side of horizontal axis, looking at "front" of rod. Oil hole must aline with hole in rod.**

(3) Refer to figure 6–17. Support the connecting rod with bushing installed, under an arbor press on backing plate. The plate will prevent the bushing from pushing out during burnishing operations. Insert burnishing broach in bushing and press through with arbor press. After removing burnishing broach, finish-size the bushing to 1.6258/1.6255 inch on suitable honing machine.

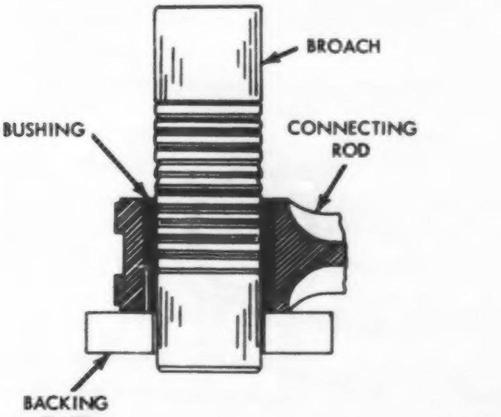


Figure 6–17. Burnishing connecting rod bushing.

Figure 6–18. Checking ring gap clearance.

(4) Inspect connecting rod bores and bearings in the same manner as described in paragraph 6–9, for main bearing inspection. Replace all connecting rods and bearing halves that do not check within limits specified in repair and rebuild standards (par. 6–22).

b. *Piston Pins.* Replace piston pins that are cracked or have deep nicks or scratches. Remove minor nicks or scratches with crocus cloth. Replace piston pins that are not within limits specified in repair and rebuild standards (par. 6–22).

c. *Piston Rings.* Always install new rings when rebuilding engine. Check new rings for proper ring gap as specified in repair and rebuild standards (par. 6–22), in the following manner:

(1) Insert piston ring in cylinder sleeve bore. Use one of the pistons to push ring into place.

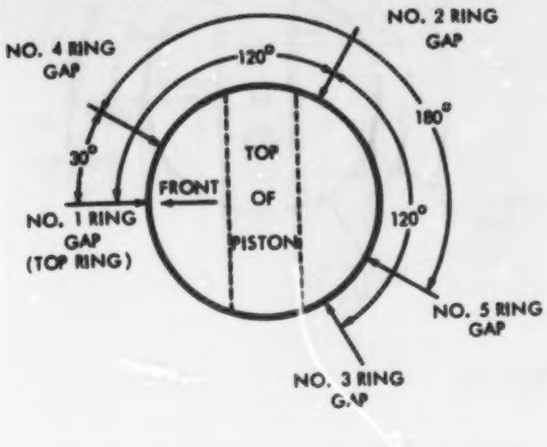
(2) Check piston ring gap clearance with a feeler gage (fig. 6–18). Refer to repair and rebuild standards (par. 6–22) for proper gap. If the ring gap is too close, the ring gap must be filed until proper clearance is obtained.

d. *Pistons.*

(1) Replace any piston that is cracked or distorted, or that shows evidence of metallic stress or fatigue.

(2) Replace any piston that is not within limits specified in repair and rebuild standards (par. 6–22).

(3) Replace pistons that are cracked, worn, or abraded in the piston pin bore.



ORD E43537

Figure 6-19. Positioning ring gaps on piston.

(4) Replace piston if oil holes in ring lands cannot be cleaned, or if lands are damaged.

(5) Remove minor burrs, nicks, or scratches from pistons with crocus cloth.

6-21. Assembly

a. Heat piston to 180°-F. Position connecting rod in piston and insert piston pin in piston and connecting rod bore. Pin should slide into heated piston and rod with slight push of thumb. Install new pin retaining snaprings. Front side of connecting rod should face front of piston.

Note. Install pistons, connecting rods, and bearing halves in their original positions, using marks made in disassembly procedure. Lubricate all parts with engine oil during assembly.

b. Install rings using figure 6-14 as a guide.

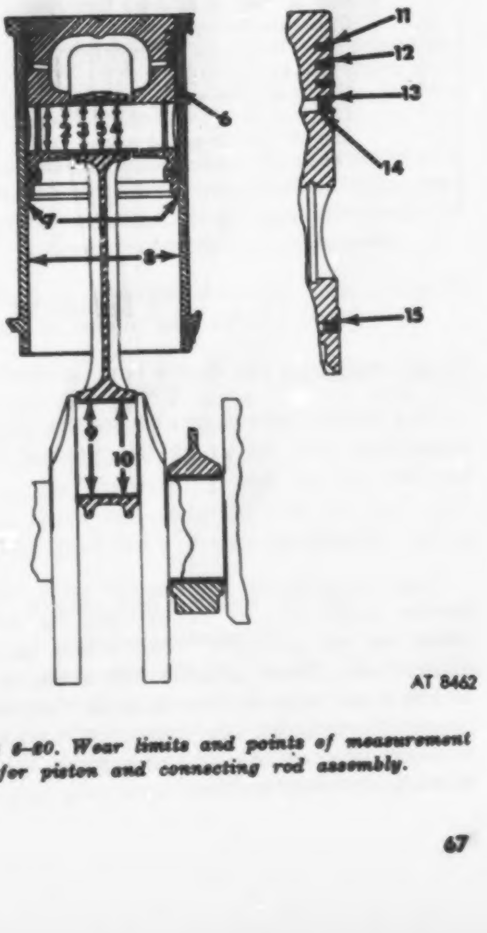
(1) Install two equalizer springs (3) and two oil control rings (2). When installing oil control rings, position butt of equalizer springs 180 degrees from ring gap.

(2) Install three compression rings (1) on piston.

(3) Stagger gaps of adjacent rings apart (fig. 6-19) to assure proper oil control.

6-22. Repair and Rebuild Standards for Connecting Rod and Piston Assembly

The repair and rebuild standards included in table 5, with points of measurement shown in figure 6-20, give the minimum and maximum clearances of new and rebuilt parts. They also give wear limits that indicate the point to which a part may be worn before replacement is required. Minimum, maximum, and wear limit dimensions are in inches unless otherwise indicated. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond the limits given in the "Size and fit of new parts" column. The letter "L" indicates a loose fit (clearance), and the letter "T" indicates a tight fit (interference).



AT 8462

Figure 6-20. Wear limits and points of measurement for piston and connecting rod assembly.

Table 5. Repair and Rebuild Standards for Piston and Connecting Rod Assembly

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	CONNECTING RODS AND PISTON PINS			
3	Inside diameter of bushing bore in connecting rod	1.6875 to 1.6885	•	•
4	Free outside diameter of piston pin bushing	1.6925 to 1.694	•	•
5	Inside diameter of piston pin bushing	1.6252 to 1.6255	•	•
2	Outside diameter of piston pin	1.6245 to 1.6247	•	•
2–5	Fit of piston pin in bushing	0.0007 to 0.0011	•	•
	CONNECTING ROD JOURNAL END			
10	Inside diameter of bearing bore in connecting rod	3.1795 to 3.1800	•	•
9	Inside diameter of connecting rod bearing at proper torque tightness.	2.9991 to 3.0006	•	•
	PISTON AND PISTON PIN			
6	Diameter at top of piston skirt 90 degrees to piston pin	4.8657 to 4.8662	•	•
7	Diameter at bottom of piston skirt 90 degrees to piston pin	4.8697 to 4.8702	•	•
8	Inside diameter of cylinder sleeve	4.875 to 4.877	4.879	•
7–8	Fit of piston in cylinder sleeve	0.005 to 0.007	•	•
1	Inside diameter of piston pin bore in piston	1.6244 to 1.6246	•	•
2	Outside diameter of piston pin	1.6244 to 1.6245	•	•
1–2	Fit of piston pin in piston	0.0001T to 0.0002L		
	COMPRESSION RINGS			
11	Major width of ring	0.1175 to 1.1180	•	•
12	Depth of ring	0.191 to 0.201	•	•
	Gap of ring in cylinder bore (refer to fig 6–18)	0.013 to 0.025	•	•
12	Clearance between compression ring and land of piston	0.0020 to 0.0060	•	•
	OIL CONTROL RINGS			
13	Width of ring	0.1885 to 0.1865	•	•
14	Depth of ring (not including equalizer)	0.115 to 0.125	•	•
	Gap of ring in cylinder bore (refer to fig 6–18)	0.013 to 0.025	•	•
14	Clearance between No. 4 ring and ring land of piston	0.0010 to 0.0045	•	•
15	Clearance between No. 5 ring and ring land of piston	0.0010 to 0.0045	•	•

Section VI. REPAIR OF CRANKSHAFT

6–23. General

This section covers procedures for cleaning, inspection, and repair of the crankshaft assembly.

6–24. Cleaning

Clean crankshaft thoroughly with mineral spirits paint thinner or drycleaning solvent. Clean all oil passages with steam or compressed air. Use a probe brush or brass wire to clean out any sludge or gum deposits. If steam is used, dry the crankshaft with low-pressure compressed air and apply a thin coat of oil to prevent rusting.

6–25. Inspection

a. Carefully inspect for cracks, using magnaflux equipment or a strong light and magnifying glass, paying particular attention to areas around oil holes and fillets adjacent to crank cheeks.

b. Inspect areas adjacent to rod journal for evidence of wear that would indicate a bent or twisted connecting rod.

c. Check diameters of main bearing journals and connecting rod journals against repair and rebuild standards (par. 6–27).

d. Check runout of crankshaft by support-

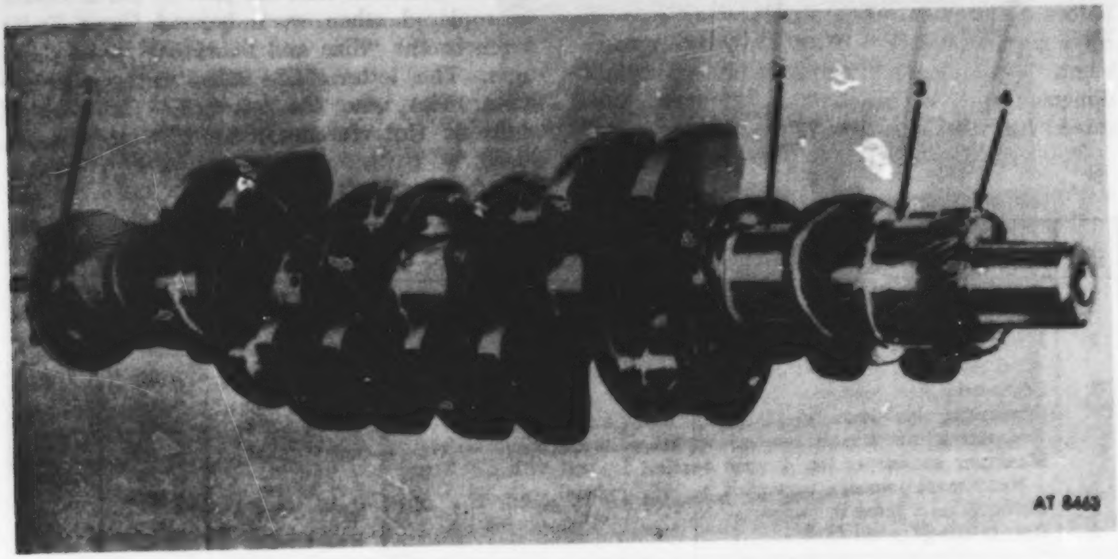


Figure 6–21. Wear limits and points of measurement for crankshaft assembly.

ing main journals in "V" blocks and measuring the runout at No. 4 journal, with a suitable dial indicator.

e. Check crankshaft gear for cracks, gear tooth wear, and looseness of gear on crankshaft. Inspect gear teeth for sharp burrs and galled or pitted surfaces.

f. Check crankshaft end play and gear backlash against limits specified in repair and rebuild standards (par. 6–27).

g. Inspect flywheel bolts as outlined in paragraph 6–4.

6–26. Repair

a. Replace crankshaft if cracked or showing evidence of wear due to bent or twisted connecting rods.

b. Replace crankshaft when connecting rod journals or main bearing journals are worn beyond limits specified in repair and rebuild standards (par. 6–27).

c. Remove minor burrs and sharp fins from crankshaft gear, with crocus cloth.

d. Replace gear if cracked. There are no established wear limits for gear teeth. Good judgment is required to determine need for replacement.

Note. Replacement of the crankshaft gear necessitates the replacement of the camshaft and auxiliary shaft gears. These three gears are supplied in matched sets only.

e. Remove crankshaft gear if looseness is evident, using suitable gear puller. Check gear bore and crankshaft end. Excessive wear at either part will necessitate replacement.

f. Replace damaged flywheel bolts to limits specified in repair and rebuild standards.

g. Replace crankshaft gear by heating to approximately 400° F using hot oil bath, hot plate, heat lamp, or oven. Assemble key to shaft and quickly slide gear onto crankshaft with larger chamfer of bore facing rear of engine. Drive gear onto shaft as far as it will go before gear has a chance to chill.

6–27. Repair and Rebuild Standards for Crankshaft Assembly

The repair and rebuild standards included in table 6, with points of measurement shown in figure 6–21, give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement is required, in order to receive maximum service with minimum replacement. Minimum, maximum, and wear limit dimensions are in inches unless otherwise indicated. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond those limits given in the "Size and fit of new parts" column. The letter "L" indicates a loose fit (clearance), and the letter "T" indicates a tight fit (interference).

Table 6. Repair and Rebuild Standards for Crankshaft Assembly

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	CRANKSHAFT			
3	Main bearing journals	2.9985–2.9990	2.997	*
	Main bearing clearance at proper torque tightness	0.002–0.0045	0.006	*
2	Connecting rod journals	2.9975–2.998	2.996	*
	Connecting rod bearing clearance at proper torque tightness	0.0011–0.0031	0.0046	*
	End play at No. 4 main bearing journal	0.004–0.011	adjust	adjust
	Maximum runout at No. 4 main bearing journal with No. 1 and No. 7 main journals supported in "V" blocks.		0.0015	*
1	Flywheel bolt press in flange	0.0005–0.002	*	*
4	Crankshaft gear backlash	0.002–0.004	*	*

Section VII. REBUILD OF CYLINDER HEAD ASSEMBLY

6–28. General

a. This section covers disassembly, cleaning, inspection, repair, and assembly of the cylinder head assembly.

b. The front and rear cylinder head assemblies are identical and are interchangeable. For parts identification and relationship, refer to figure 6–22.

6–29. Disassembly

a. *Valve Stem Locks* (*fig. 6–23*). Using a suitable spring compressor tool, compress valve springs and remove valve stem locks.

b. *Rotator Cap, Outer Valve Spring, Inner Valve Spring, Valve, and Valve Guide* (*fig. 6–24*). Remove rotator cap, outer valve spring, and inner spring from top of cylinder head assembly. Turn cylinder head on its side and remove valve from the bottom of cylinder head. Using a suitable puller, remove valve guide through the top of the cylinder head if necessary (see par. 6–31b).

Note. Repeat above operations for all valves, keeping removed valves in proper sequence for inspection and reassembly purposes.

6–30. Cleaning

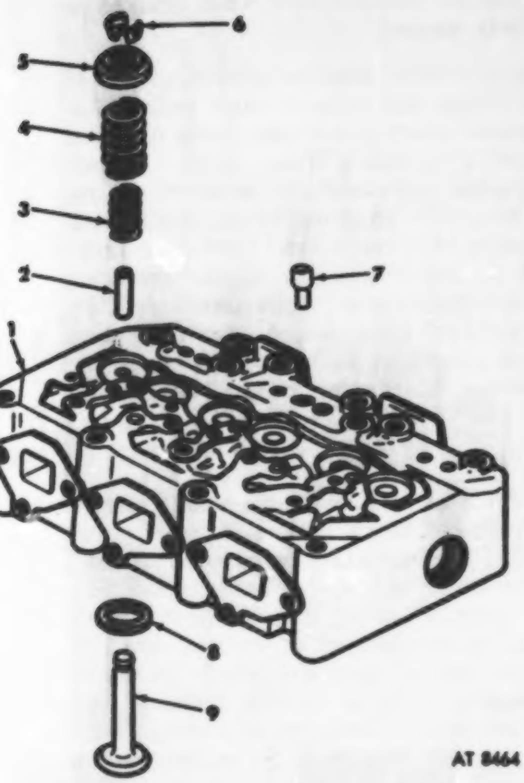
a. Thoroughly clean cylinder head assembly, valve springs, valves, and valve rotators. Remove heavy carbon deposits, making sure not to nick or scratch the gasket surface or valve seat surface. Use reamer FSN 5110–977–7411 to remove carbon from injector nozzle sleeve.

b. Clean inner and outer surfaces of casting with drycleaning solvent or mineral spirits paint thinner. Blow out all casting holes and dry with compressed air.

b. Remove carbon deposits with a scraper and wire brush, and clean with a carbon remover solvent.

6–31. Inspection

a. *Cylinder Head.* Check cylinder head for cracks, especially near fillets, around studs and core plugs. Replace cracked cylinder head. Check gasket surfaces for burrs or nicks. Check cylinder head for warpage, using a straightedge and feeler gage, against limits specified in repair and rebuild standards (par. 6–33). Inspect studs for bent condition or



Cylinder head
Valve guide
Inner spring
Outer spring
Rotator cap
6 Valve stem lock
7 Injection nozzle sleeve
8 Valve seats
9 Valve

igure 6-22. Cylinder head assembly—exploded view.

Figure 6-23. Removing or installing valve stem locks.

Figure 6-24. Removing or installing rotator cap, outer valve spring, inner valve spring, and valve.

damaged threads. Check core plugs for evidence of coolant leakage.

b. *Valve Guides.* Inspect valve guides for cracks, galling, erosion, and scuffing. Check guides for secure fit in cylinder head. Check valve guides against limits specified in repair and rebuild standards (par. 6–33). Mark unserviceable guides for replacement.

c. *Valve Seats.* Check intake and exhaust valve seats for secure fit and for burned or pitted condition. Check valve contact on seat by coating the face with Prussian blue and placing a new or reground valve in position on the seat. Rotate the valve one-half turn and check valve contact area. Mark valve seats for repair, that do not show perfect contact.

d. *Valves.* Check intake and exhaust valves for evidence of pitting, imperfect seating, or warpage on valve head. Mark valves for repair, that are burned, warped, or pitted. Check valves against limits specified in repair and rebuild standards (par. 6–33).

e. *Valve Springs.* Inspect inner and outer valve springs for wear, breaks, cracks, or other evidence of failure. Check springs against limits specified in repair and rebuild standards (par. 6–33). Test springs for proper tension, using a valve spring tester, or compare with a new valve spring.

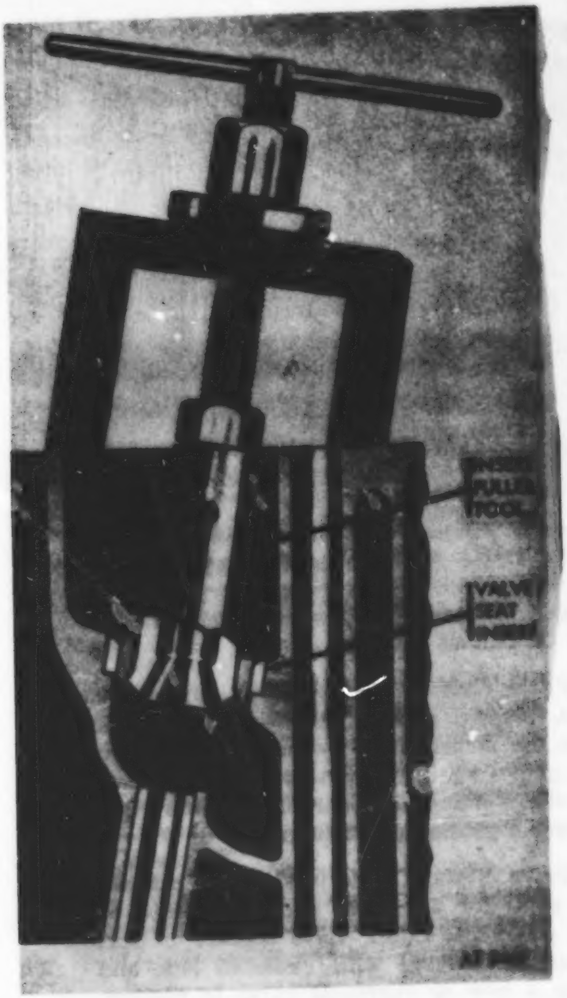


Figure 6–25. Removing valve seat inserts.

f. *Valve Rotators and Retainers Locks.* Check valve rotator by rotating inner section which must rotate freely. Inspect rotator for wear or cracks. Spring retainer locks must be replaced when rebuilding cylinder head assembly.

g. *Injector Nozzle Sleeve.* Inspect sleeves for cracks, galling, and scuffing. Check sleeves for secure fit in cylinder head. Check sleeves against limits specified in repair and rebuild standards (par. 6–33). Mark unserviceable sleeves for replacement.

6–32. Repair

a. *Cylinder Head.* Replace studs that are stripped or broken. Replace all leaking core plugs. Replace cylinder head when cracked or excessively warped.

b. *Valve Guides.* Replace cracked, galled, or scuffed intake and exhaust valve guides. Replace guides which do not meet limits in repair and rebuild standards (par. 6–33). Replace valve guides, using suitable remover and replacer tool with an arbor press. Install new valve guide in cylinder head bore from deckside of cylinder head, to depth dimension specified in repair and rebuild standards. New guides will have to be reamed after installation in cylinder head, to limits specified in repair and rebuild standards (par. 6–33), using reamer 17–T–1793.

Note. See note (d below).

c. *Valve Seats.* Replace valve seats that cannot be repaired. Use a valve seat insert puller (fig. 6–25) to remove seat which will not damage counterbore of cylinder head. Install new seat in counterbore of cylinder head. Install new seat in counterbore of cylinder head, to limits specified in repair and rebuild standards (par. 6–33), using a suitable replacer tool. When new seats are installed or when old seats can be made serviceable, grind as described in 1 through 3 below.

(1) Grinding stone must be true to a 30-degree, +30, −0 minutes angle, to grind valve seats. Refer to item 10, figure 6–26.

(2) After grinding seat, check valve contact as described in paragraph 6–31c.

(3) Keep valve seat as near as possible to center of valve face. Narrow seat as necessary, using a 15-degree grinding stone. Valves should never seat at the top or bottom of the face.

d. *Valves.* Replace warped intake and exhaust valves. Replace valves having badly pitted or burned faces. Replace valves having scratched or scored stems, or that do not meet limits specified in repair and rebuild standards (par. 6–33). Replace valves if locking grooves are damaged. Grind slightly pitted or burned valves that do not seat perfectly as described in paragraph 6–31c. Replace valves that cannot be ground to limits specified in repair and rebuild standards (par. 6–33).

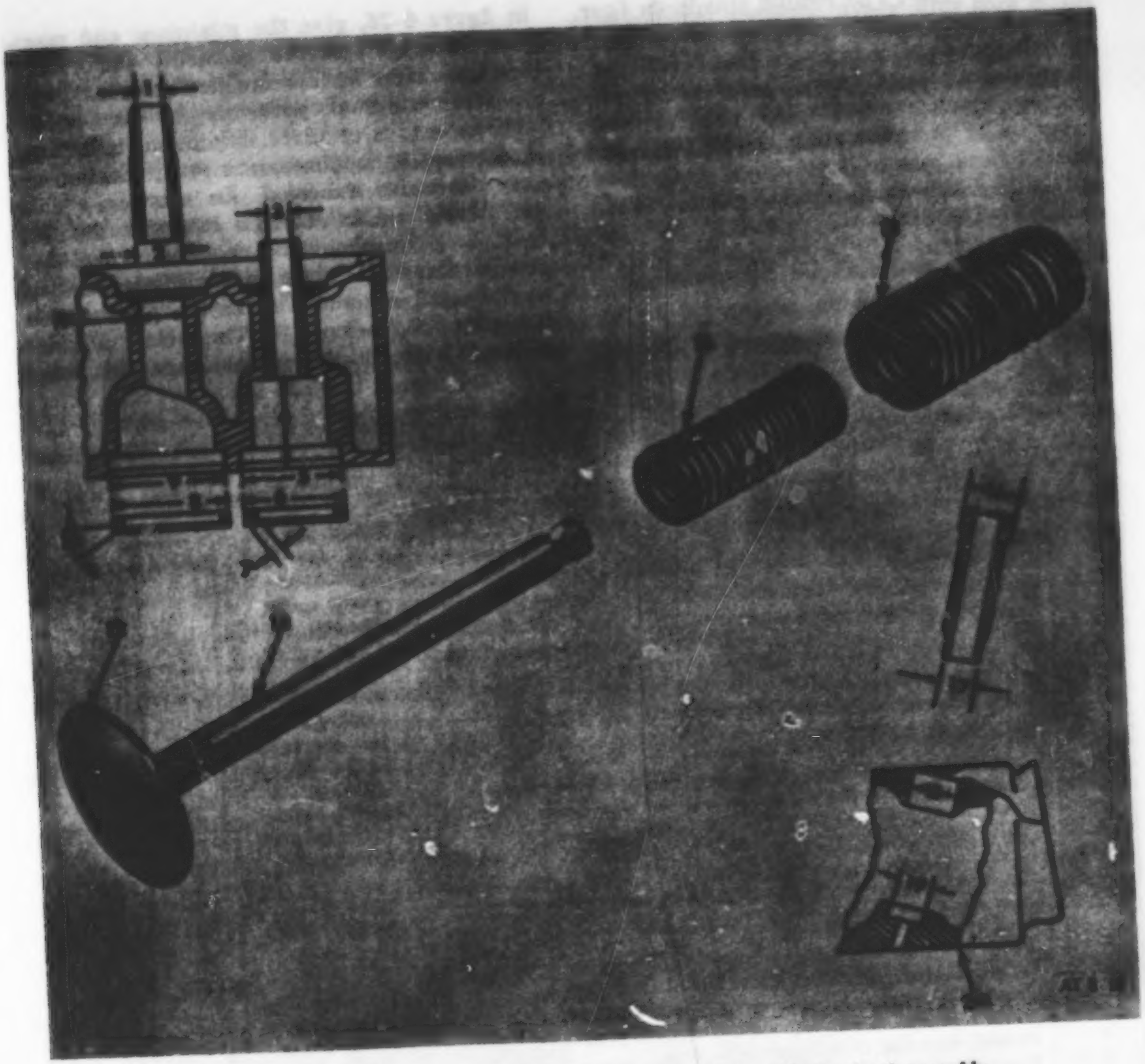


Figure 6-26. Wear limits and points of measurement for cylinder head assembly.

Note. Engines FSN 2815-980-7092, were built with exhaust valves having a stem diameter of .497-.498. This valve required a valve guide having a .501-.502 ID to provide the necessary .003 to .005 clearance. Engines FSN 2815-087-2273 and 2815-045-6865 are built with both the intake and exhaust valve guides having a .4995-.5005 ID. The exhaust valve required in this engine has a reduced stem diameter of .4955-.4965 to provide the necessary .003-.005 clearance. The new reduced stem exhaust valve may also be used in the .501-.502 valve guides but under no circumstances should a valve with a stem diameter of .497-.498 be used in a .4995-.5005-ID valve guide. Check both the guide bore and the valve stem diameter with an accurate micrometer before assembly. The intake valve guide bore and valve stem are the same in both engines.

e. *Valve Springs.* Replace inner and outer valve springs when worn, cracked, or otherwise damaged. Replace springs that do not meet limits specified in repair and rebuild standards (par. 6-33).

f. *Valve Rotators and Retainers Locks.* Replace valve rotator when inner section does not rotate freely, or is worn or cracked. Replace all retainer locks when rebuilding cylinder head assembly.

g. *Injector Nozzle Sleeve.* Replace nozzle sleeve when cracked, scored, or loose in cylinder head bore. Replace sleeve not within limits specified in repair and rebuild standards (par. 6–33). Replace injector nozzle sleeve, using a suitable tool to remove nozzle sleeve from cylinder head. To install new injector sleeve, heat cylinder head to 180° F and apply oil and water sealer to sleeve surface, and press into cylinder head bore to limits specified in repair and rebuild standards (par. 6–33) with installer 17–T–11395.

6–33. Repair and Rebuild Standards for Cylinder Head Assembly

The repair and rebuild standards included in table 7, with points of measurement shown in figure 6–26, give the minimum and maximum clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement is required. Minimum, maximum, and wear limits dimensions are in inches unless otherwise indicated. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond the limits given in the "Size and fit of new parts" column. The letter "T" indicates tight fit; "L" a loose fit. The letter "L" indicates a loose fit (clearance), and the letter "T" indicates a tight fit (interference).

Table 7. Repair and Rebuild Standards for Cylinder Head Assembly.

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	VALVES AND VALVE GUIDES			
12	Valve face angle	30° +0'/30'	*	*
	Valve face runout	*	0.0015	*
13	Valve stem diameter (intake and exhaust)	0.497–0.498	*	*
13	(reduced exhaust valve stem)	0.4955–0.4965 (see par. 6–32d)	*	*
1	Inside diameter of intake valve guide	0.4995–0.5005	*	*
13–1	Fit of intake valve stem in guide	0.0015–0.0035	*	*
3	Inside diameter of exhaust valve guide	0.501–0.502	*	*
3	(guide for reduced exhaust stems)	0.4995–0.5005 (see par. 6–32d)		
13–3	Fit of exhaust valvo stem in guide	0.003–0.005	*	*
11	Inside diameter of valve guide bore in cylinder head	0.6860–0.6870	*	*
2	Outside diameter of valve guide	0.6881–0.6886	*	*
11–2	Press fit of valve guide in cylinder head	0.0011–0.0026T	*	*
4	Valve guide above valve spring seat	30°-0'/+30'	*	*
	VALVE SEATS			
10	Seat angle	1.5408	*	*
7	Seat width	0.0625–0.0937	*	*
	Seat runout	------------	0.0015	*
9	Inside diameter of intake valve seat bore in cylinder head	2.437–2.438	*	*
8	Outside diameter of intake valve seat	2.4395–2.4405	*	*
8–9	Press fit of intake valve seat in cylinder head bore	0.0015–0.0035T	*	*
5	Inside diameter of exhaust valve seat bore in cylinder head	2.0845–2.0855	*	*
6	Outside diameter of exhaust valve seat	2.082–2.083	*	*
5–6	Press fit of exhaust valve seat in cylinder head bore	0.0015–0.0035T	*	*
	VALVE SPRINGS			
14	Inner valve springs			
	Nominal free length	2.3125	*	*
	Scale reading at 2.0312-inch length	82.1 lb–86.4 lb	77.2 lb	*
15	Outer valve springs			
	Nominal free length	2.4062	*	*
	Scale reading at 2.1562-inch length	105.3 lb–110.3 lb	94.4 lb	*
	NOZZLE HOLDER SLEEVE			
18	Inside diameter of sleeve bore in cylinder head (large end)	1.216–1.218	*	*
19	Inside diameter of sleeve bore in cylinder head (small end)	1.062–1.064	*	*
16	Outside diameter of nozzle holder sleeve (large end)	1.2205–1.2210	*	*
17	Outside diameter of nozzle holder sleeve (small end)	1.0665–1.0670	*	*
17–19	Press fit of sleeve in cylinder head (top and bottom only)	0.0025–0.005T	*	*
	CASTING			
20	Surface deflection each head (checked with straightedge and feeler gage).	*	0.0015 per 12"	*

6–34. Assembly

a. Lubricate valve guide bore with a light coat of refined petrolatum mixed with 10 percent colloidal graphite. Apply with bore brush to full length of guide.

b. Reassemble the head assemblies in reverse of disassembly (par. 6–29).

Section VIII. REBUILD OF ROCKER ARMS, SHAFT, AND PUSH ROD ASSEMBLIES

6–35. General

a. This section covers disassembly, cleaning, inspection, repair, and assembly of the rocker arms, shaft, push rods, and related parts.

b. The front and rear sets of rocker arms are identical and are interchangeable. The disassembly and assembly procedures for the front and rear assemblies are identical; therefore, only one sequence will be covered.

6–36. Disassembly

a. Refer to figure 6–27. Unscrew and remove two rocker arm shaft plugs. Remove two rocker arm short springs and two outer rocker arms.

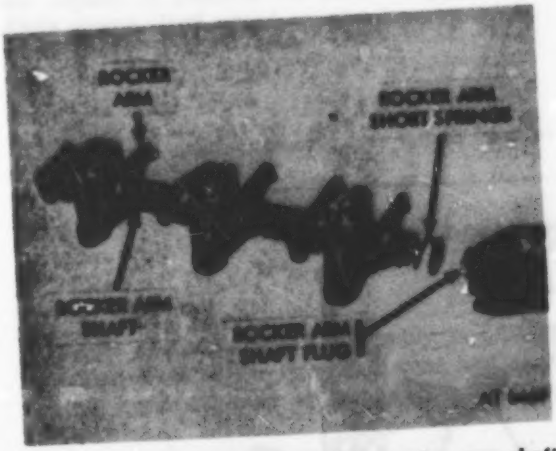


Figure 6–27. Removing or installing rocker arm shaft plugs, short springs, and outer rocker arms.

b. Refer to figure 6–28. Unscrew and remove three setscrews from rocker arm shaft supports. Remove two outer rocker arm shaft supports, two rocker arms, two rocker arm long springs, two inner rocker arms, and center shaft support.

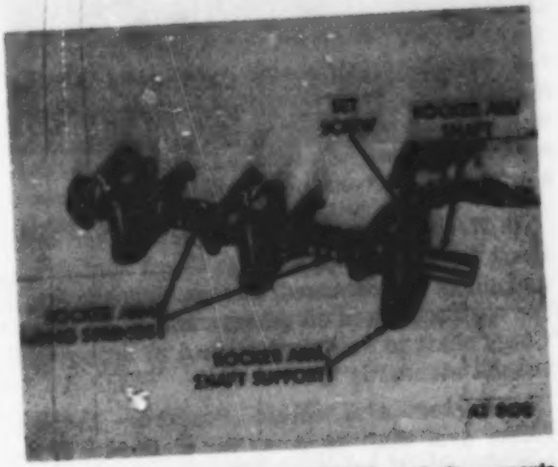


Figure 6–28. Removing or installing shaft supports, rocker arms, and long springs.

6–37. Cleaning

a. Thoroughly clean rocker arms, springs, supports, and shaft, with drycleaning solvent or mineral spirits paint thinner.

b. Blow out all oil holes, and dry parts with compressed air after cleaning.

6–38. Inspection

a. *Rocker Arms.* Inspect rocker arms for cracks, scoring, wear, and burrs. Inspect bushings for scoring and fit in rocker arms. Check bushings against wear limits specified in repair and rebuild standards (par. 6–41). Inspect adjusting screw for damaged threads and wear on pad.

Note. Original rocker arms in Engine FSN 2815–980–7092 were made of steel and take bushings requiring extensive machining. The rocker arms in Engines FSN 2815–087–2273 and 2815–045–6865 are of malleable iron, and therefore need no bushings. The malleable iron type of rocker arm is to be used instead of rebushing the steel one.

Figure 6-29. Valve push rods.

b. *Rocker Arm Shaft.* Inspect rocker arm shaft for cracks and scoring. Check shaft ends and plugs for damaged threads. Inspect shaft for obstructions in oil passage and all oil holes. Check shaft to limits established in repair and rebuild standards (par. 6-41).

c. *Rocker Arm Shaft Supports.* Inspect rocker arm shaft supports for nicks and scoring. Check oil passage to be sure it is clean and free of obstructions.

d. *Rocker Arm Springs.* Inspect rocker arm springs for wear, cracks, set, or other evidence of failure. Check springs for limits established in repair and rebuild standards (par. 6-41).

e. *Valve Push Rods.* Inspect valve push rods (fig. 6-29) for roughness, scratches, grooves, or evidence of loose or worn ball or socket ends. Check rod straightness by rolling on a flat surface. Check oil passage to be sure it is clean and free of obstructions.

6-39. Repair

a. *Rocker Arms.* Replace rocker arms when worn, cracked, or deeply scored. Remove minor nicks or burrs with crocus cloth. Rocker arm bushings that do not meet limits specified in repair and rebuild standards (par. 6-41) must be replaced with either the steel, bushed arm or the newer cast arm. Replace adjusting screw and nut when threads are damaged, or when screw binds in rocker arm.

b. *Rocker Arm Shaft.* Replace cracked or deeply scored rocker arm shaft. Replace shafts that do not meet wear limits specified in repair and rebuild standards (par. 6-41).

c. *Rocker Arm Supports.* Replace rocker arm supports that are cracked or scored. Remove minor nicks or burrs with crocus cloth.

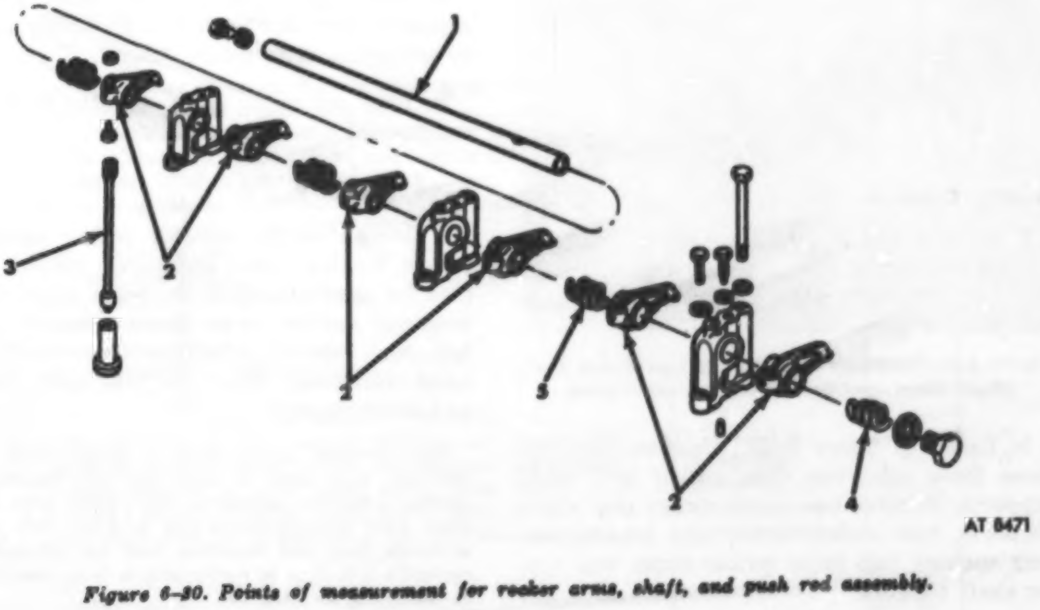


Figure 6-30. Points of measurement for rocker arms, shaft, and push rod assembly.

d. *Rocker Arm Springs.* Replace rocker arm springs that are worn, cracked, or otherwise show evidence of failure, or which do not agree with those wear limits specified in the repair and rebuild standards (par. 6–41).

e. *Valve Push Rods.* Replace all bent or excored push rods. Replace push rods with excessive wear on ends or which do not meet wear limits specified in repair and rebuild standards (par. 6–41).

6–40. Assembly

Reassemble the rocker arm and shaft assemblies in reverse order of disassembly (par. 6–36).

6–41. Repair and Rebuild Standards for Rocker Arm and Shaft Assembly

The repair and rebuild standards included in table 8, with points of measurement shown in figure 6–30, give the minimum and maximum clearances of new or rebuilt parts. They also give wear limits that indicate that point to which a part or parts may be worn before replacement. Minimum, maximum, and wear limit dimensions are in inches unless otherwise indicated. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond those limits given in the "Size and fit of new parts" column. The letter "L" indicates a loose fit (clearance), and the letter "T" indicates a tight fit (interference).

Table 8. Repair and Rebuild Standards for Rocker Arms, Shafts, and Push Rod Assemblies

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	ROCKER ARMS AND SHAFTS			
2	Inside diameter of rocker arm or bushing	1.1296–1.1301	0.008	0.008
1	Outside diameter of rocker arm shaft	1.1286–1.1291	0.002	0.002
1–2	Bushing-to-shaft clearance	0.0005–0.0015 L	0.010	0.010
4	Outer valve rocker arm spring	8.5 lb ±.85 at .625 in.	*	*
5	Inner valve rocker arm spring	9.0 lb @ 1.6875 ±.1562 in.	*	*
	VALVE PUSH RODS			
3	Overall length (measured over ⅛-inch diameter ball placed in socket end).	15.4218 in.	*	*

Section IX. REPAIR OF CAMSHAFT ASSEMBLY

6–42. General

Repair of the camshaft assembly is limited to replacement of the camshaft gear and alining key, and removal of minor burrs, nicks, and scratches.

6–43. Disassembly

Remove camshaft gear from camshaft, using suitable gear puller tool. Remove alining key from camshaft.

6–44. Cleaning

Clean camshaft thoroughly with drycleaning solvent or mineral spirits paint thinner, and dry with low-pressure compressed air.

6–45. Inspection and Repair

a. Inspect camshaft journals and camshaft lobes for scratches, nicks, or cracks. Smooth minor scratches and abraisions with a fine stone, and polish with crocus cloth. Replace camshaft that is severely damaged or does not meet wear limits established in repair and rebuild standards (par. 6–47).

b. Inspect camshaft gear for worn, pitted, or galled teeth. Remove sharp fins and burrs from gear teeth, with crocus cloth. Replace gear having broken teeth or excessively worn keyway.

Note. Replacement of the camshaft gear necessitates the replacement of the auxiliary shaft and crankshaft gears. These three gears are supplied in matched sets only.

6–46. Assembly

a. Insert key in keyway of camshaft.

b. Position gear so that keyway in gear is alined with key in camshaft.

c. Press gear on camshaft.

6–47. Repair and Rebuild Standards

The repair and rebuild standards included in table 9, with points of measurement or inspection shown in figure 6–31, give the minimum and maximum clearances of new or rebuilt parts. An asterisk in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond the wear limits given in the "Size and fit of new parts" column. The letter "L" indicates a loose fit (clearance), and the letter "T" indicates a tight fit (interference).

Table 9. Repair and Rebuild Standards for Camshaft Assembly

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	CAMSHAFT			
2	Outside diameter of bearing journals No. 1–No. 6	2.439–2.440	2.435	2.435
	Clearance No. 1—No. 6 bearing journals	0.001–0.004 L	0.005	0.005
1	Outside diameter of No. 7 bearing journal	2.251–2.252	2.247	2.247
	Journal to bearing clearance No. 7 journal	0.0015–0.0035 L	0.0045	0.0045
	End play (adjusted at thrust button on gear cover)	0.008–0.014	adjust	adjust
	CAMSHAFT GEAR			
3	Backlash of camshaft gear	0.002–0.004	*	*

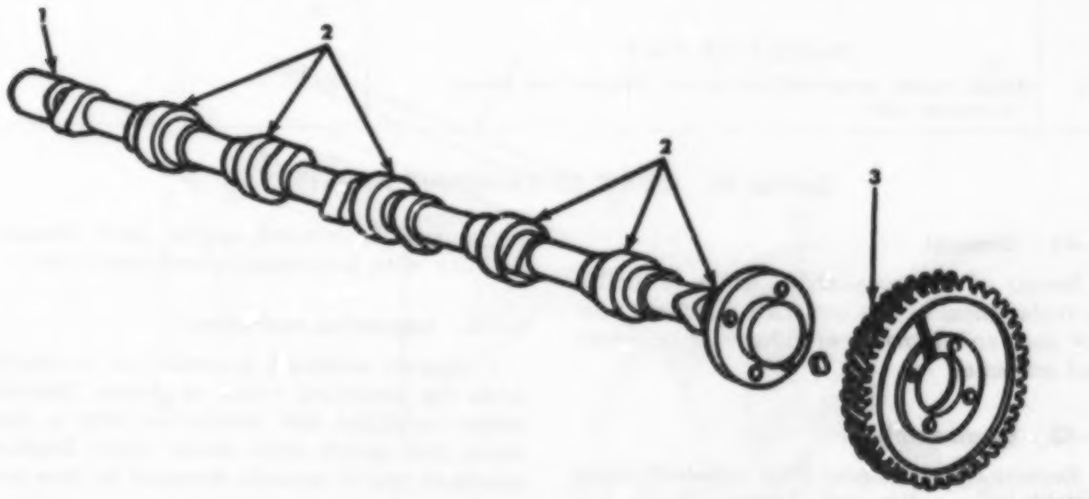


Figure 6–31. Points of measurement or camshaft assembly.

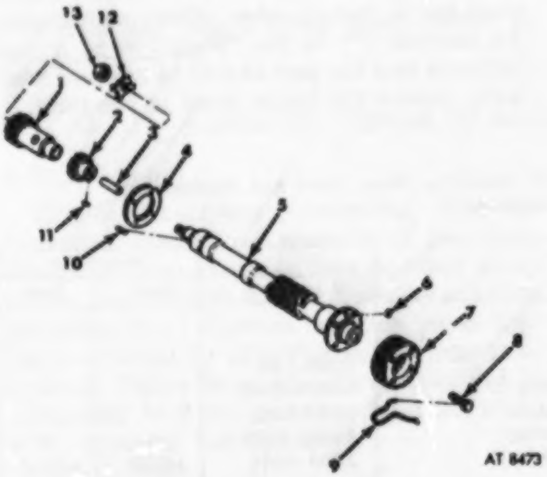
Section X. REPAIR OF AUXILIARY DRIVE SHAFT AND TACHOMETER DRIVE ASSEMBLIES

6–48. General

This section covers disassembly, cleaning, inspection, repair, and assembly of the auxiliary drive shaft and tachometer drive assemblies.

6–49. Disassembly

a. *Auxiliary Drive Shaft Assembly (fig. 6–32).* Cut, remove, and discard lockwire (9) securing four capscrews (8) in auxiliary drive shaft gear (7). Remove four capscrews (8) and auxiliary drive shaft gear (7) from auxiliary drive shaft (5). Remove key (6) from keyway. Unlock washer (12) and remove nut (13) and lockwasher. Pull air compressor drive coupling (1) complete with spacer (2) from auxiliary drive shaft (5). Remove spacer (oil pump gear) key (11), air compressor oil feed tube (3) and thrust washer (4) from auxiliary drive shaft (5).



1 Air compressor drive coupling (external spline)
2 Spacer (oil pump drive gear—commercial model engine only)
3 Air compressor oil feed tube
4 Thrust washer
5 Auxiliary drive shaft
6 Key
7 Auxiliary drive shaft gear
8 Capscrew
9 Lockwire
10 Air compressor coupling key
11 Oil pump gear key
12 Lockwasher
13 Nut

Figure 6–32. Auxiliary drive shaft—exploded view.

Note. To remove tube (3), tap with a 5/16-18 NC tap. Insert capscrew and pull from shaft (5).

Note. Spacer (2) is used on commercial models of this engine as the oil pump drive gear. On military models its sole function is that of spacer between the air compressor drive coupling and the auxiliary drive shaft journal.

b. *Tachometer Drive Assembly (fig. 6–33).*

Note. Disassembly of the tachometer drive assembly is not required unless gear or shaft is actually damaged.

Drive out pin securing tachometer drive gear to drive shaft. Remove drive gear and drive shaft from housing. Remove and discard gasket.

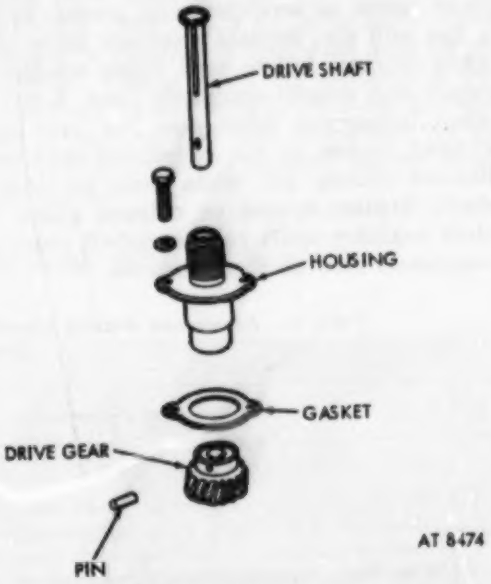


Figure 6–33. Tachometer drive assembly—exploded view.

6–50. Cleaning

Clean the auxiliary drive shaft and tachometer drive assemblies with drycleaning solvent or mineral spirits paint thinner. Clean oil passages and dry thoroughly with low-pressure compressed air.

6–51. Inspection

Note. **Refer to figures 6–32 and 6–33 for parts location and identification.**

a. Inspect auxiliary drive shaft journals for nicks, burrs, or scratches. Check auxiliary drive shaft and tachometer drive shaft against wear limits (par. 6–53). Check keyways and pinholes for damage. Check all threads for stripping or excessive wear.

b. Inspect gears for nicks, burrs, or cracks. Check alining pins for snug fit. Check keys for snug fit in keyways. A damaged or loose-fitting key will be cause for replacement.

6–52. Repair

There are no repairs that can be made to the auxiliary drive shaft or the tachometer drive shaft except the removal of minor nicks, burrs, or scratches from the gears, splines, keyways, or journal surfaces. Remove minor nicks, burrs, or scratches with crocus cloth or a fine mill file. Replace auxiliary drive shaft when journals fail to meet limits specified in repair and rebuild standards (par. 6–53), or when tachometer drive gear has been badly chipped, broken, or has excessively worn teeth. Replace alining pin when bent or loose in shaft. Replace broken or chipped gears. Replace auxiliary shaft gear, camshaft gear, and crankshaft gear as a matched set.

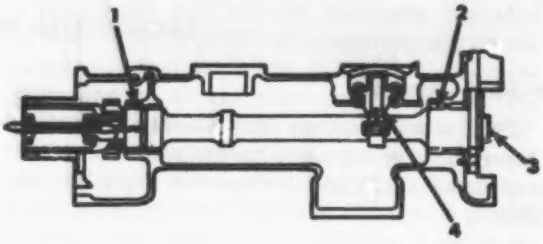


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Figure 6–34. Points of measurement for auxiliary drive shaft and tachometer drive assemblies.

6–53. Repair and Rebuild Standards for Auxiliary Drive Shaft and Tachometer Drive Assemblies

The repair and rebuild standards included in table 10 and shown in figure 6–34 give the maximum and minimum clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement is required. Minimum, maximum, and wear limits dimensions are in inches unless otherwise indicated. An asterisk (*) in the "Wear limits" column indicates that the part should be replaced when worn beyond the limits given in the table.

Table 10. Repair and Rebuild Standards for Auxiliary Drive Shaft and Tachometer Drive Assemblies

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
	AUXILIARY DRIVE SHAFT			
1	Outside diameter of auxiliary shaft rear journal	1.998–1.99	*	*
	Clearance of auxiliary shaft rear journal to bearing	0.0015–0.003	*	*
2	Outside diameter of auxiliary shaft front journal	2.061–2.062	*	*
	Clearance of auxiliary shaft front journal to bearing	0.0015–0.003	*	*
3	End play (adjust at thrust button on gear cover)	0.008–0.014	adjust	adjust
	TACHOMETER DRIVE SHAFT			
4	Clearance (tachometer drive gear to housing)	0.004–0.008	*	*

Section XI. REPAIR OF TIMING GEARS

6–54. General

This section covers cleaning, inspection, and repair of the timing gears. Individual gears were removed in the indicated paragraphs.

a. *Crankshaft Gear.* Refer to paragraph 6–26e.

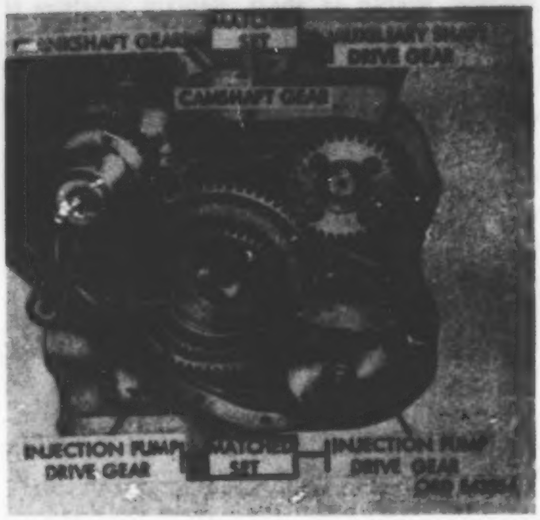

CRANKSHAFT GEAR
MATCHED SET
AUXILIARY SHAFT DRIVE GEAR
CAMSHAFT GEAR
INJECTION PUMP DRIVE GEAR
MATCHED SET
INJECTION PUMP DRIVE GEAR

Figure 6–35. Identification of timing gear matched sets.

b. *Injector Pump Driven Gear.* Refer to paragraph 5–17a.

c. *Injector Pump Drive Gear.* Refer to paragraph 5–17c

d. *Auxiliary Shaft Drive Gear.* Refer to paragraph 5-17b.

e. *Camshaft Gear.* Refer to paragraph 6–45b.

6–55. Cleaning and Inspection

a. *Cleaning.* Clean timing gears with drycleaning solvent or mineral spirits paint thinner. Use stiff brush or wooden scraper to remove sludge or gum deposits from gear grooves and teeth. Care must be taken not to remove timing identification markings on gears.

b. *Inspection.* Inspect all gear teeth for wear, sharp fins, burrs, and pitted surfaces. Check gears for cracks and broken teeth.

6–56. Repair

Burrs or raised metal surfaces may be removed with a fine mill file or crocus cloth. Gears that are cracked, chipped, or that have broken teeth must be replaced. There are no established wear limits on gear teeth. Good judgment is required to determine need for replacement. Timing gears are supplied in two matched sets as shown in figure 5–35. Replacement of any one gear will necessitate the replacement of the entire matched set, for maximum service.

Section XII. REPAIR OF INJECTION PUMP DRIVE ASSEMBLY

6–57. General

This section covers disassembly, cleaning, inspection, repair, and assembly of the injection pump drive assembly. The injection pump driven gear and hub were removed as a unit in paragraph 5–17. Correct injection pump timing is obtained by adjusting hub to gear relationship. Follow those procedures described in paragraph 10–2 for retiming injection pump after replacing hub and gear.

6–58. Disassembly

a. Refer to figure 6–36. Remove Woodruff key from keyway on shaft. Remove retainer nut cotter pin and remove nut. Remove injection pump drive shaft, spacer, and rear bearing assembly from rear of housing.

b. Refer to figure 6–37. Remove spacer from injection pump drive shaft. Using suit-

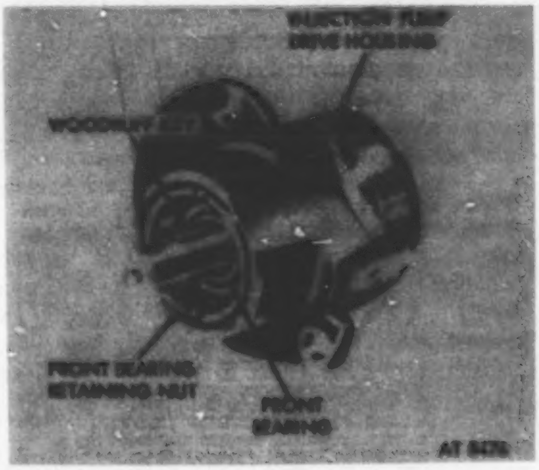

INJECTION PUMP DRIVE HOUSING
WOODRUFF KEY
FRONT BEARING RETAINING NUT
FRONT BEARING

Figure 6–36. Disassembly or assembly of injection pump drive assembly.

able puller, remove rear bearing from injection pump drive shaft.

c. Refer to figure 6–38. Press front bearing from front of housing.

6–59. Cleaning

a. Clean inner and outer surfaces of housing thoroughly with drycleaning solvent or mineral spirits paint thinner. Blow out oil passage and dry housing with low-pressure compressed air. Clean shaft and spacer with drycleaning solvent and dry thoroughly. (Refer to figure 6–39 for parts identification.)

b. Bearings require special cleaning procedures. Refer to TM 9–214.

6–60. Inspection and Repair

Check housing, shaft, and spacer for cracks, burrs, or excessive wear. Replace cracked housing, spacer, or shaft. Replace bearings if pitted or excessively worn. Repair minor burrs and scratches with a fine mill file or crocus cloth. Replace Woodruff key if badly scored, or if fit is loose in keyway of shaft.

6–61. Assembly

a. Assemble front bearing to housing. Secure in place with externally threaded nut. Torque nut to 75 lb ft.

b. If cotter pin hole is not alined with slot, drill a new hole with a No. 34 drill and install new cotter pin from outside.

c. Install shaft, rear bearing, and spacer assembly to the housing. Replace hub and gear using key. Replace nut, torquing to 140 lb ft.

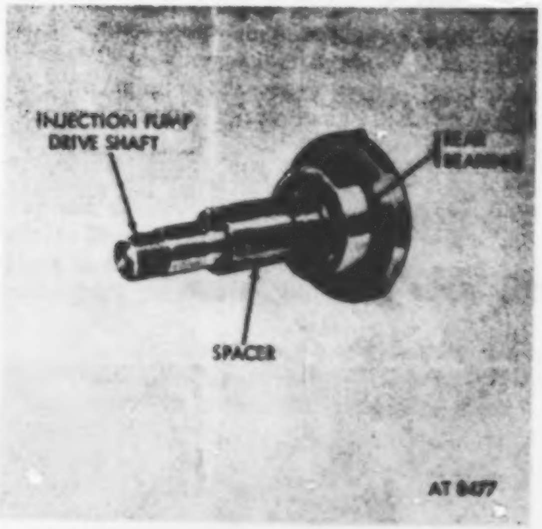


Figure 6–37. Disassembly or assembly of injection pump shaft, spacer, and rear bearing assembly.

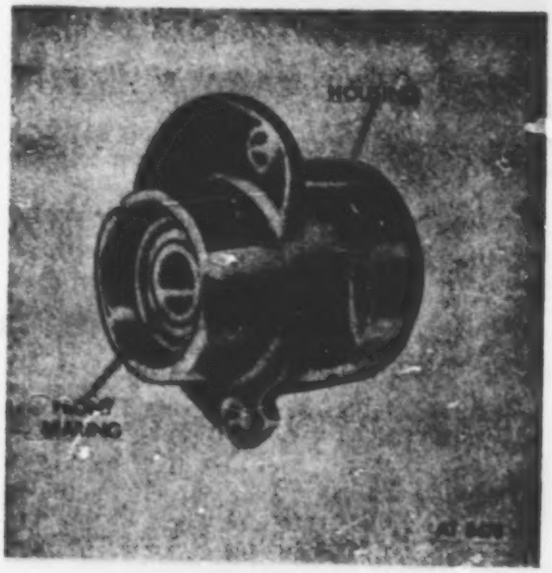
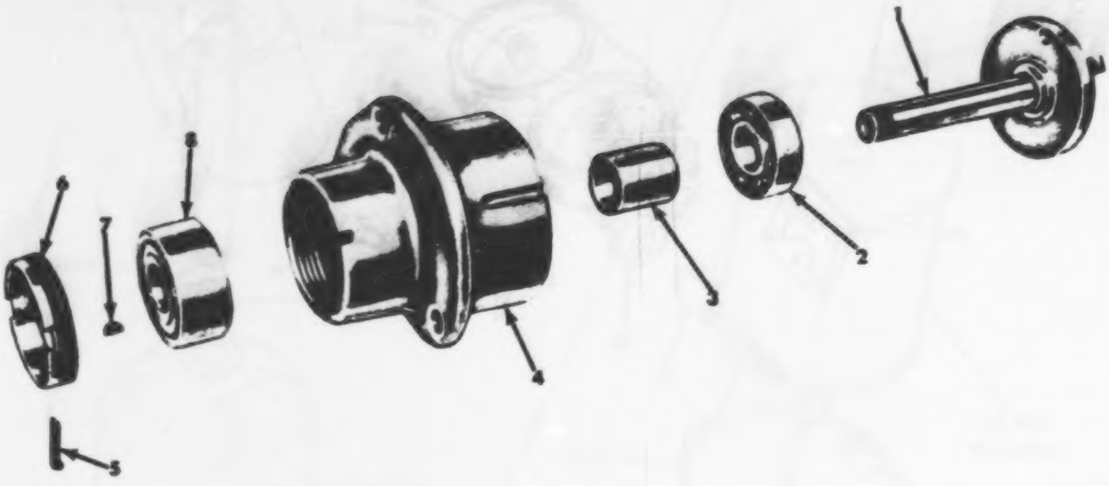


Figure 6–38. Disassembly or assembly of injection pump drive housing.



1 Injector pump drive shaft
2 Bearing, rear
3 Spacer, bearing
4 Housing
5 Cotter pin
6 Bearing retainer nut
7 Key
8 Bearing, front

Figure 6–39. Injection pump drive assembly—exploded view.

Section XIII. REPAIR OF OIL FILTERS, BASE PLATE, AND PRESSURE REGULATOR VALVE

6–62. General

This section covers disassembly, cleaning, inspection, repair, and reassembly of the filter base plate, and the full-flow and bypass oil filters. The pressure regulator valve, located in the filter base plate, is also covered in this section.

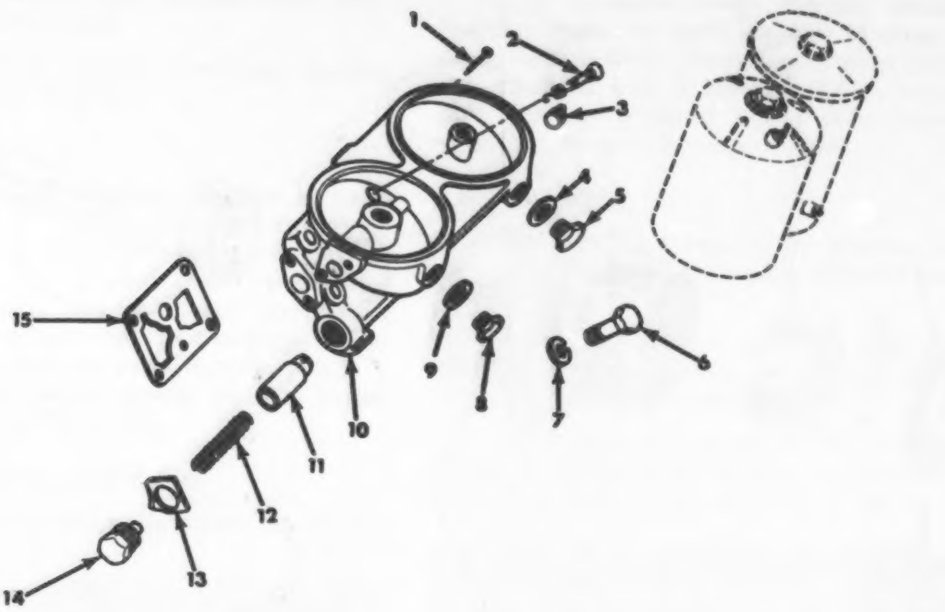
6–63. Filter Base Plate

a. *Disassembly*. Refer to figure 6–40. Remove pressure regulator valve plug (14) and lockwasher (13) from base plate (10). Remove valve plunger spring (12) and plunger (11). Remove setscrew (1) securing check valve assembly (2) in base plate, and remove check valve and spring. Remove filter base plugs (5 and 8) and gaskets (4 and 9).

b. *Cleaning*. Clean filter base plate thoroughly with drycleaning solvent or mineral spirits paint thinner. Clean oil passages with a stiff brush, and probe to free all obstructions. Dry passages by blowing them out with compressed air.

c. *Inspection*. Inspect the regulator valve plunger and plunger bore in base plate for scratches or wear. Inspect check valve and seat for cracks or signs of wear. Check valve springs for resiliency or breaks. Inspect machined surface of base plate for cracks, burrs, or raised metal areas.

d. *Repair*. Replace the regulator valve plunger and base plate if either part is scratched or excessively worn. Replace springs when cracked, or when they have lost



AT 8480

1	Setscrew
2	Check valve assembly
3	Pipe plug
4	Gasket
5	Bypass filter base plug
6	Capscrew
7	Lockwasher
8	Full-flow filter base plug
9	Gasket
10	Filter base plate
11	Plunger
12	Valve plunger spring
13	Lockwasher
14	Pressure regulator valve plug
15	Gasket

Figure 6–40. Filter base plate—exploded view.

their resiliency or do not meet those limits specified in the repair and rebuild standards (par. 6–65). Repair minor scratches and raised metal on machine surfaces with a fine mill file or crocus cloth. Replace base plate if cracked or warped.

e. *Assembly.* Assemble the base plate in reverse of disassembly (a above).

6–64. Oil Filters

Note. For disassembly refer to TM 9-2320-211-10 and figures 6–41 and 6–42.

a. *Cleaning.* Thoroughly clean case and related parts except gaskets and filter elements which will always be replaced when rebuilding the engine.

b. *Inspection.* Inspect filter cases for dents and damaged gasket surfaces. Check tubes for cracks and damaged threads. Examine retaining rings for cracks and check resiliency.

c. *Repair.* Repair minor damage to filter and tubes. Gasket surfaces may be resurfaced using crocus cloth on a flat surface. Replace filter case and tubes when cracked, distorted, or when gasket surface cannot be repaired. Replace retaining springs when cracked or when they have lost their resiliency. Always replace filter elements and gaskets when reassembling filters.

6–65. Repair and Rebuild Standards for Valve Plunger and Check Valve Springs

The repair and rebuild standards included in table 11 (refer to fig. 6–40 for parts identification) give the minimum and maximum resiliency for springs to be used in filter base plate assembly. These dimensions are in inches. An asterisk (*) in the "Wear limits" column indicates that the part or parts should be replaced when worn beyond those limits specified in the "Size and fit of new parts" column.

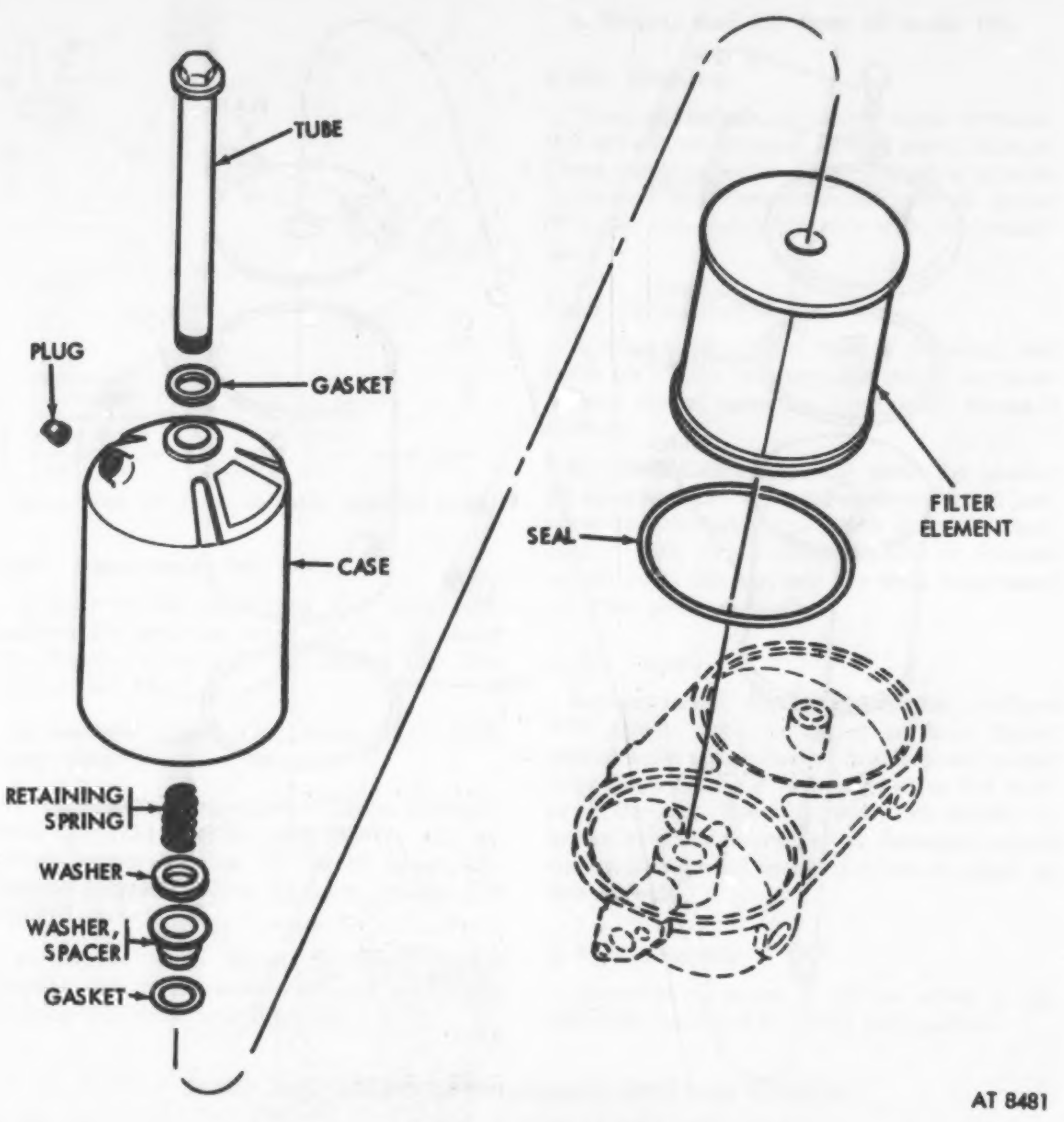

TUBE
PLUG
GASKET
CASE
RETAINING SPRING
WASHER
WASHER, SPACER
GASKET
SEAL
FILTER ELEMENT
AT 8481

Figure 6-41. Full-flow oil filter assembly—exploded view.

Table 11. Repair and Rebuild Standards for Valve Plunger and Check Valve Springs

Fig. No.	Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
				Field	Depot
6-40	12	Valve plunger (regulator) spring	28.25 lb @ 3 7/8 in.	±1.41 lb	±1.41 lb
			38.10 lb @ 3 9/16 in.	±1.85 lb	±1.85 lb
		Solid length (no permanent set)	3 3/8 in.	*	*
6-40	2	Check valve spring (eye to eye)	free length 1.67 in.	1.92 lb closed 2.14 lb	.66 lb open 1.24 lb

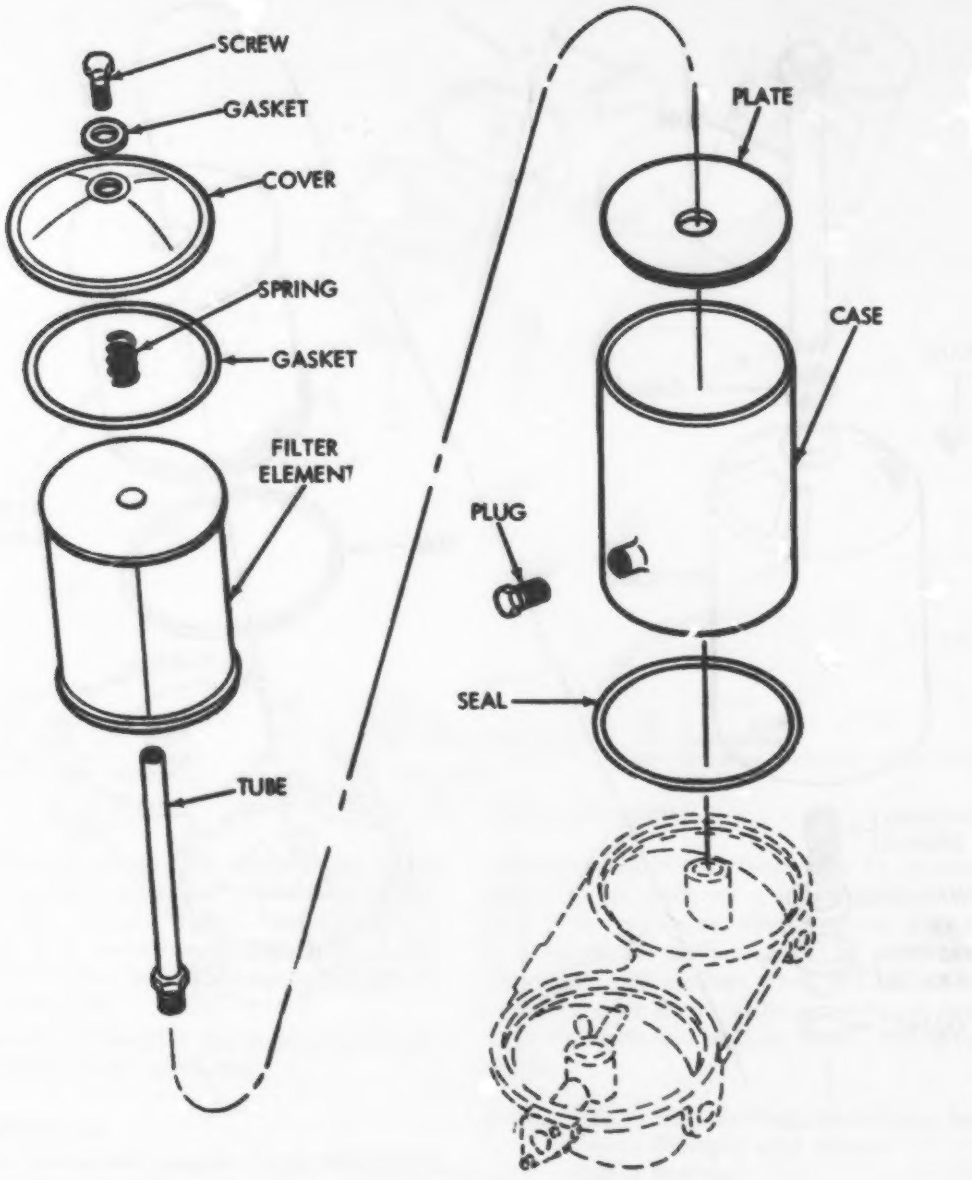

SCREW
GASKET
COVER
SPRING
GASKET
FILTER ELEMENT
TUBE
PLATE
CASE
PLUG
SEAL
AT 8482

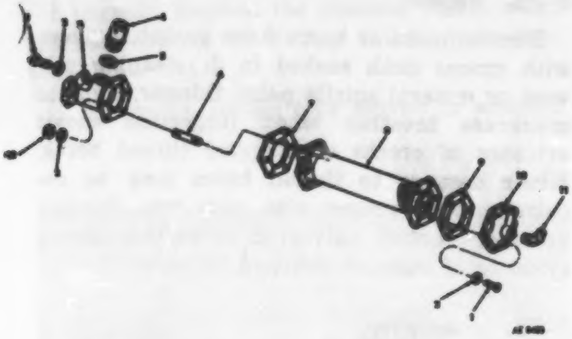
Figure 6-42. Bypass oil filter assembly—exploded view.

Section XIV. REPAIR OF OIL COOLER ASSEMBLY

6-66. General

This section covers the disassembly, cleaning, inspection, repair, and reassembly of the oil cooler assembly. Normally, this unit does not require special maintenance except for flushing and replacement of gaskets.

Note. Refer to figure 6-43 for parts identification and orientation.



1	Capscrew	7	Gasket
2	Lockwasher	8	Oil cooler
3	Bypass housing	9	Gasket
4	Water outlet	10	Cover
5	Preformed packing	11	Elbow, water inlet
6	Stud	12	Hex nut

Figure 6-43. Oil cooler assembly—exploded view.

6–67. Disassembly (fig 6–43)

a. Remove six capscrews (1) and lockwashers (2) securing cover (10) to oil cooler (8). Remove cover (10) and gasket (9). Discard gasket (9).

b. Remove water inlet elbow (11) from cover (10).

c. Remove five capscrews (1), one hexagon-head nut (12) and six lockwashers (2) securing bypass housing (3) to oil cooler (8). Remove bypass housing (3) and gasket (7). Discard gasket (7).

d. Remove water outlet (4) from bypass housing (3), if necessary. Remove preformed packing (5) from water outlet.

e. Remove stud (6) from oil cooler (8).

6–68. Cleaning

Thoroughly clean oil cooler, using drycleaning solvent or mineral spirits paint thinner. Clean water tubes in oil cooler, using a probe to remove any obstructions. Flush oil jacket of cooler thoroughly and dry with compressed air.

6–69. Inspection

a. Check oil cooler, bypass housing, and cover for cracks and damaged gasket surfaces. Inspect tapped holes and fittings for damaged threads.

b. Pressure-check the oil cooler by sealing all openings and applying pressure to oil passages and coolant tubes. Flush oil cooler thoroughly with drycleaning solvent or mineral spirits paint thinner, and dry with compressed air after pressure check.

6–70. Repair

Repair minor damage to gasket surfaces with crocus cloth on a flat surface. Repair tapped holes with a thread tap. Replace coolant inlet elbow fitting if it is cracked or has damaged threads. Replace cover, oil cooler, or bypass housing if cracked or damaged beyond repair. Replace oil cooler if pressure check indicates leaks.

6–71. Assembly

Assemble oil cooler in reverse order of disassembly (par. 6–67), using new gaskets.

Section XV. REPAIR OF CRANKCASE BREATHER ASSEMBLY

6–72. General

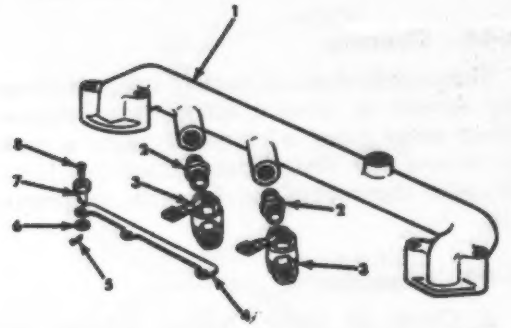
This section covers the disassembly, cleaning, inspection, repair, and assembly of the crankcase breather assembly. Repair is limited to minor repairs to, or replacement of, unserviceable parts. Refer to figure 6–44 for parts orientation and identification.

6–73. Disassembly

Remove three cotter pins (5) (located under link) and three flat washers (6) from link (4). Remove three swivels (7) and three swivel screws (8). Remove link (4). Remove two breather shutoff valves (3) and two nipples (2) from crankcase breather.

6–74. Cleaning and Inspection

Clean crankcase breather with drycleaning solvent or mineral spirits paint thinner. Inspect crankcase breather for cracks or damaged thread bores. Check gasket surfaces for nicks or burrs. Inspect shutoff valves for leaks or stripped threads.



AT 8484

1 Breather pipe
2 Nipple, ventilation valve
3 Valve, shutoff
4 Link, ventilation valve
5 Pin, Cotter
6 Washer, flat
7 Swivel
8 Swivel screw

Figure 6-44. Crankcase breather assembly—exploded view.

6-75. Repair

Remove nicks or burrs from gasket surfaces with crocus cloth soaked in drycleaning solvent or mineral spirits paint thinner. Replace crankcase breather when inspection shows evidence of cracks or stripped thread bores. Minor damage to thread bores may be repaired, using proper size pipe tap. Replace breather shutoff valves if inspection shows evidence of leaks or stripped threads.

6-76. Assembly

Install two breather shutoff valves on crankcase breather. Install linkage bar on shutoff valves, using new cotter pins.

Section XVI. REBUILD OF MANIFOLD HEATER COMPONENTS

6-77. General

This section covers the rebuild procedures for the manifold heater components.

6-78. Solenoid Valves (fig 6-45)

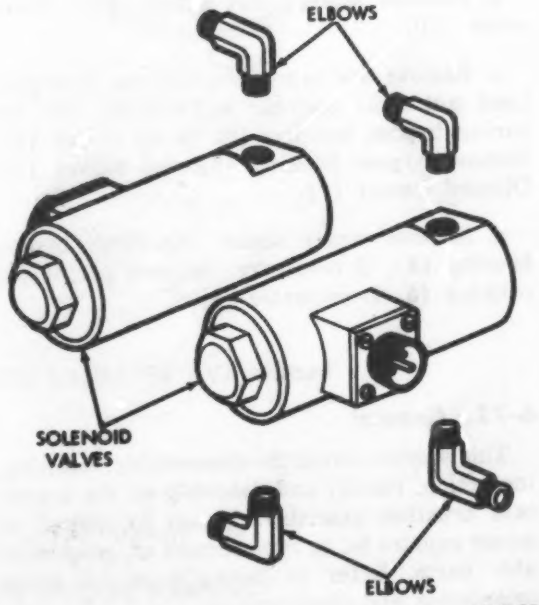
a. *Disassembly*. Remove four elbows from the solenoid valves.

b. *Cleaning and Inspection*.

(1) *Cleaning*. Plug valve inlet and outlet openings to prevent entry of foreign material. Clean the solenoid valves with a cloth moistened with drycleaning solvent. The valves contain rubber parts and should not be immersed in solvent.

(2) *Inspection*. Inspect the solenoid valve for cracks and dents. Install suitable fittings, actuate solenoid valve with 24-volt dc current, and pump fuel through the valve. When fuel flows freely, valve is functioning normally. Restricted fuel flow indicates a faulty electrical circuit or improper torque-setting of acorn nut. Loosen acorn nut and torque-tinghten nut to 40 to 50 pound-inches maximum. Recheck solenoid operation. If valve is still inoperative, replace valve.

Note. Solenoid valves are normally closed and electrical current will open valves.



AT 8485

Figure 6-45. Manifold heater solenoid valves—exploded view.

c. *Repair*. Replace the solenoid valves when cracked, dented, or if they fail to pass electrical test.

d. *Assembly*. Install four elbows in solenoid valves.

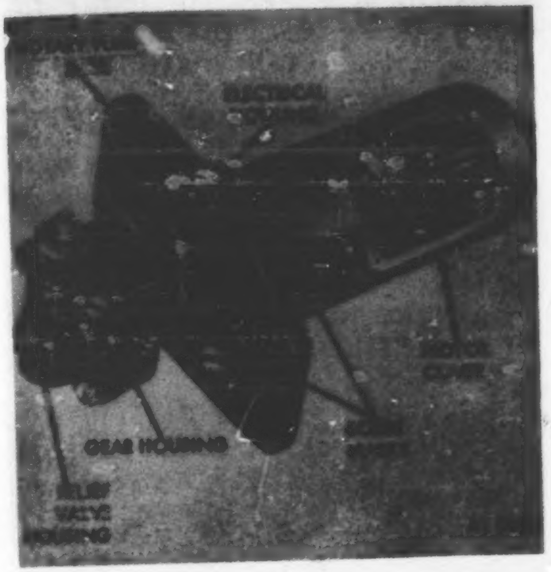

ELECTRICAL HOUSING
MOTOR COVER
GEAR HOUSING
RELIEF VALVE HOUSING

Figure 6–46. Scribing alinement marks.

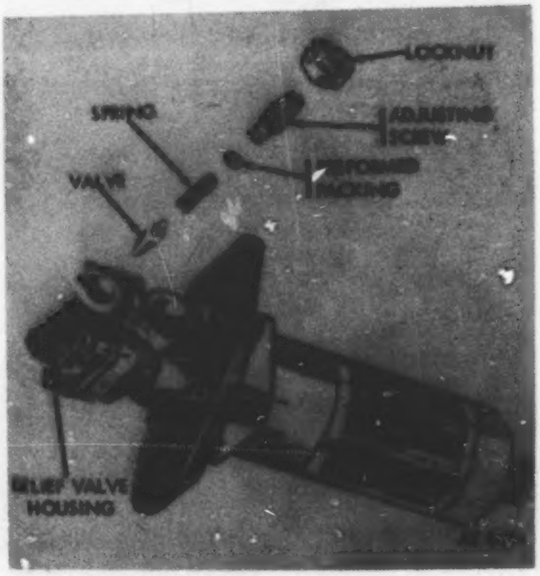

LOCKNUT
SPRING
ADJUSTING SCREW
VALVE
PREFORMED PACKING
RELIEF VALVE HOUSING

Figure 6–47. Disassembly or assembly of manifold heater fuel pump assembly relief valve.

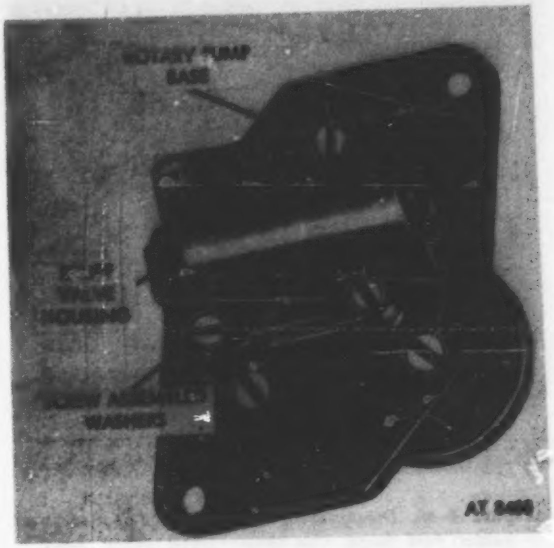

ROTARY PUMP BASE
RELIEF VALVE HOUSING
SCREW ASSEMBLIES WASHERS

Figure 6–48. Disassembly or assembly of manifold heater fuel pump assembly relief valve housing.

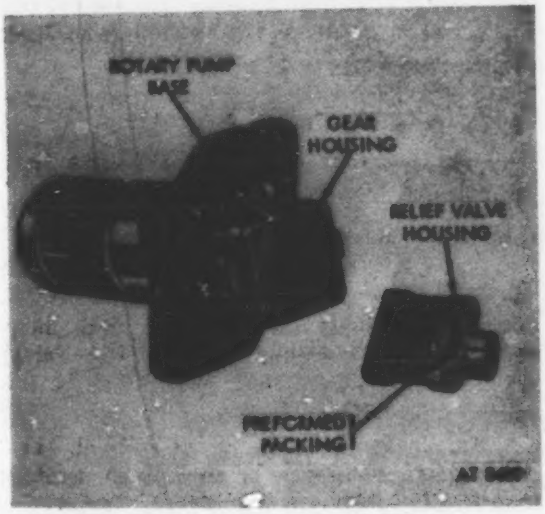

ROTARY PUMP BASE
GEAR HOUSING
RELIEF VALVE HOUSING
PREFORMED PACKING

Figure 6–49. Disassembly or assembly of manifold heater fuel pump assembly gear housing.

6–79. Manifold Heater Fuel Pump Assembly

a. *Disassembly.*

(1) Refer to figure 6–46. Scribe alinement marks on motor cover, electrical housing, rotary pump base, gear housing, and relief valve housing.

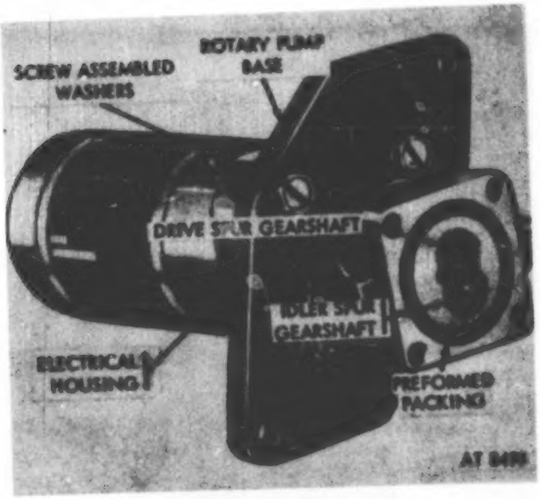

SCREW ASSEMBLED WASHERS
ROTARY PUMP BASE
DRIVE SPUR GEARSHAFT
IDLER SPUR GEARSHAFT
ELECTRICAL HOUSING
PREFORMED PACKING

Figure 6-50. Disassembly or assembly of manifold heater fuel pump assembly—rotary pump base.

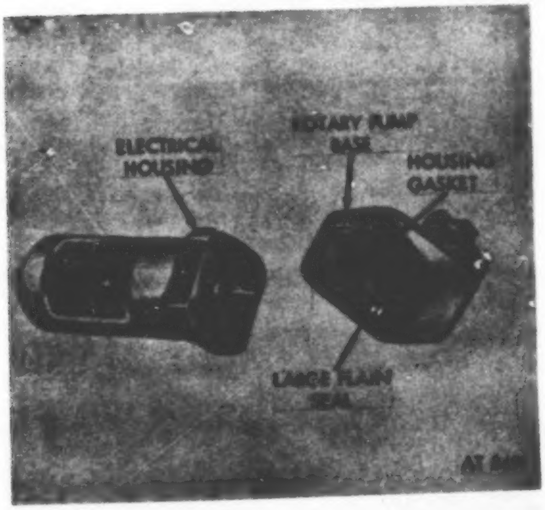

ELECTRICAL HOUSING
ROTARY PUMP BASE
HOUSING GASKET
LARGE PLAIN SEAL

Figure 6-51. Disassembly or assembly of manifold heater fuel pump assembly—rotary pump base gasket and seal.

(2) Refer to figure 6-47. Remove locknut. Remove relief valve adjusting screw from relief valve housing. Remove preformed packing from relief valve adjusting screw and discard. Remove compression spring and relief valve from relief housing.

(3) Refer to figure 6-48. Remove four assembled washer screws securing relief valve housing to rotary pump base. Remove relief valve housing.

(4) Refer to figure 6-49. Remove preformed packing from relief valve housing. Discard packing. Remove gear housing from rotary pump base.

(5) Refer to figure 6-50. Remove preformed packing from rotary pump base. Dis-

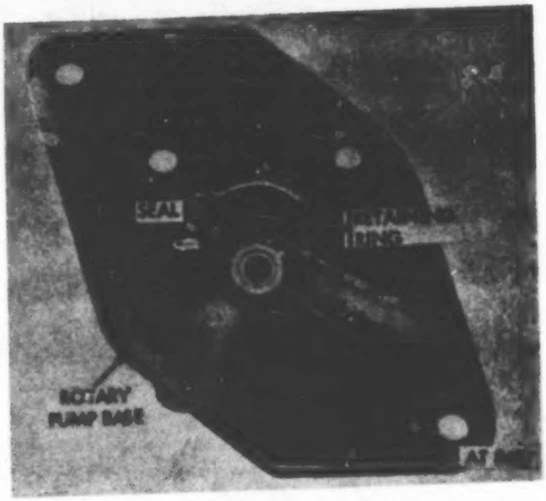

SEAL
RETAINING RING
ROTARY PUMP BASE

Figure 6-52. Disassembly or assembly of manifold heater fuel pump assembly—rotary pump base ring and plain seal.

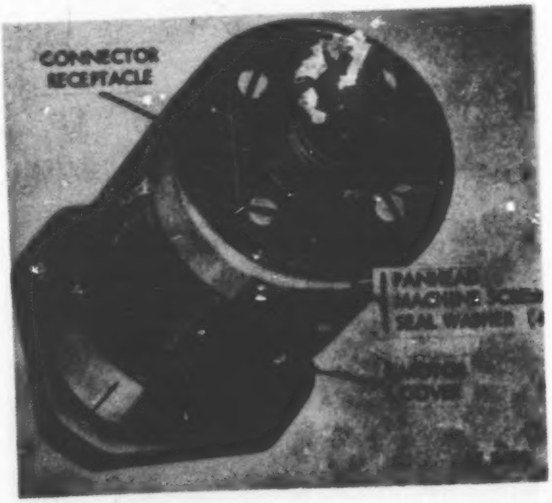

CONNECTOR RECEPTACLE
PANHEAD
MACHINE SCR
SEAL WASHER (4
COVER

Figure 6-53. Disassembly or assembly of manifold heater fuel pump assembly—connector receptacle.

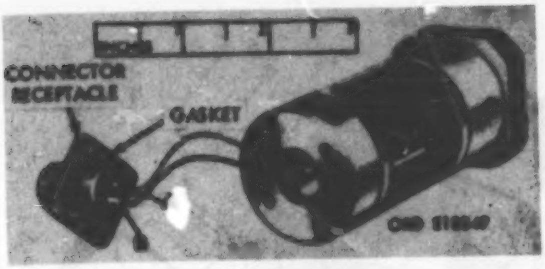

INCHES
CONNECTOR RECEPTACLE
GASKET
ORD 518847

Figure 6–54. Disassembly or assembly of manifold heater fuel pump assembly—unsoldering or soldering connector receptacle.

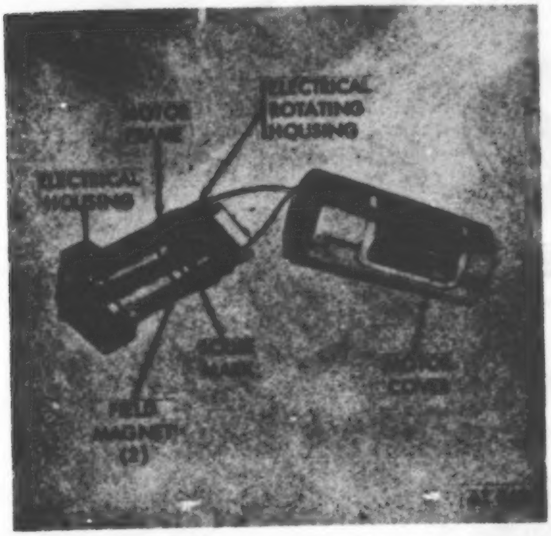

ELECTRICAL ROTATING HOUSING
MOTOR FRAME
ELECTRICAL HOUSING
SCRIBE MARK
MOTOR COVER
FIELD MAGNETS (2)

Figure 6–55. Disassembly or assembly of manifold heater fuel pump assembly—electrical housing cover.

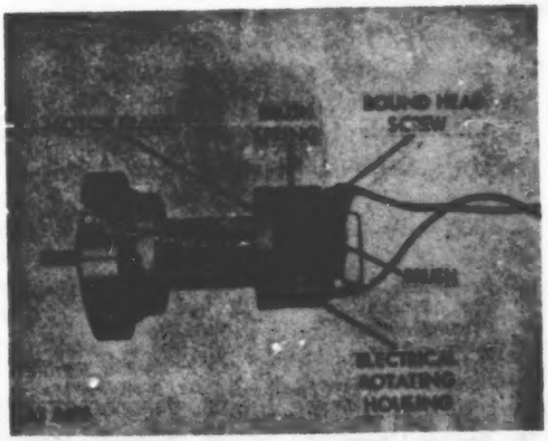

MOTOR FRAME
BRUSH SPRING
ROUND HEAD SCREW
BRUSH
ELECTRICAL ROTATING HOUSING

Figure 6–56. Disassembly or assembly of manifold heater fuel pump assembly—electrical rotating housing.

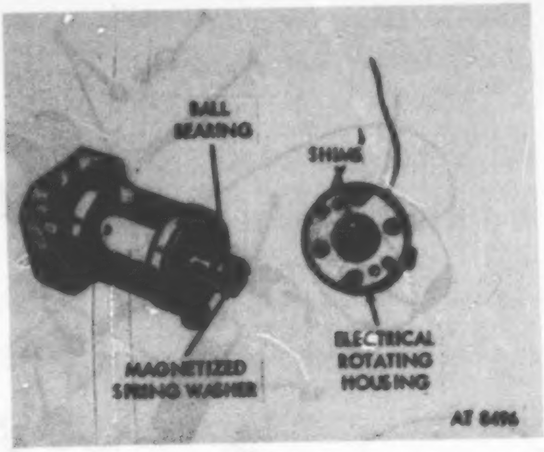

BALL BEARING
SHIMS
MAGNETIZED SPRING WASHER
ELECTRICAL ROTATING HOUSING
AT 8496

Figure 6–57. Disassembly or assembly of manifold heater fuel pump assembly—spring washer and shims.

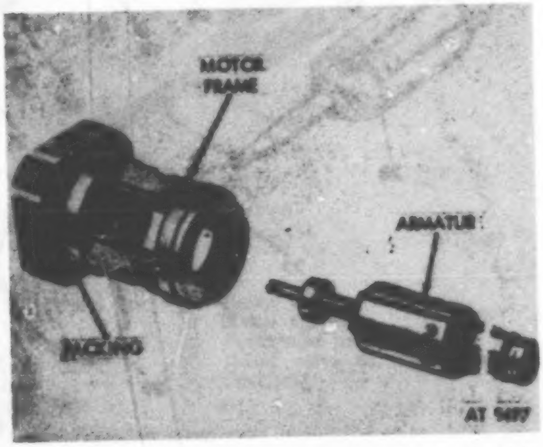
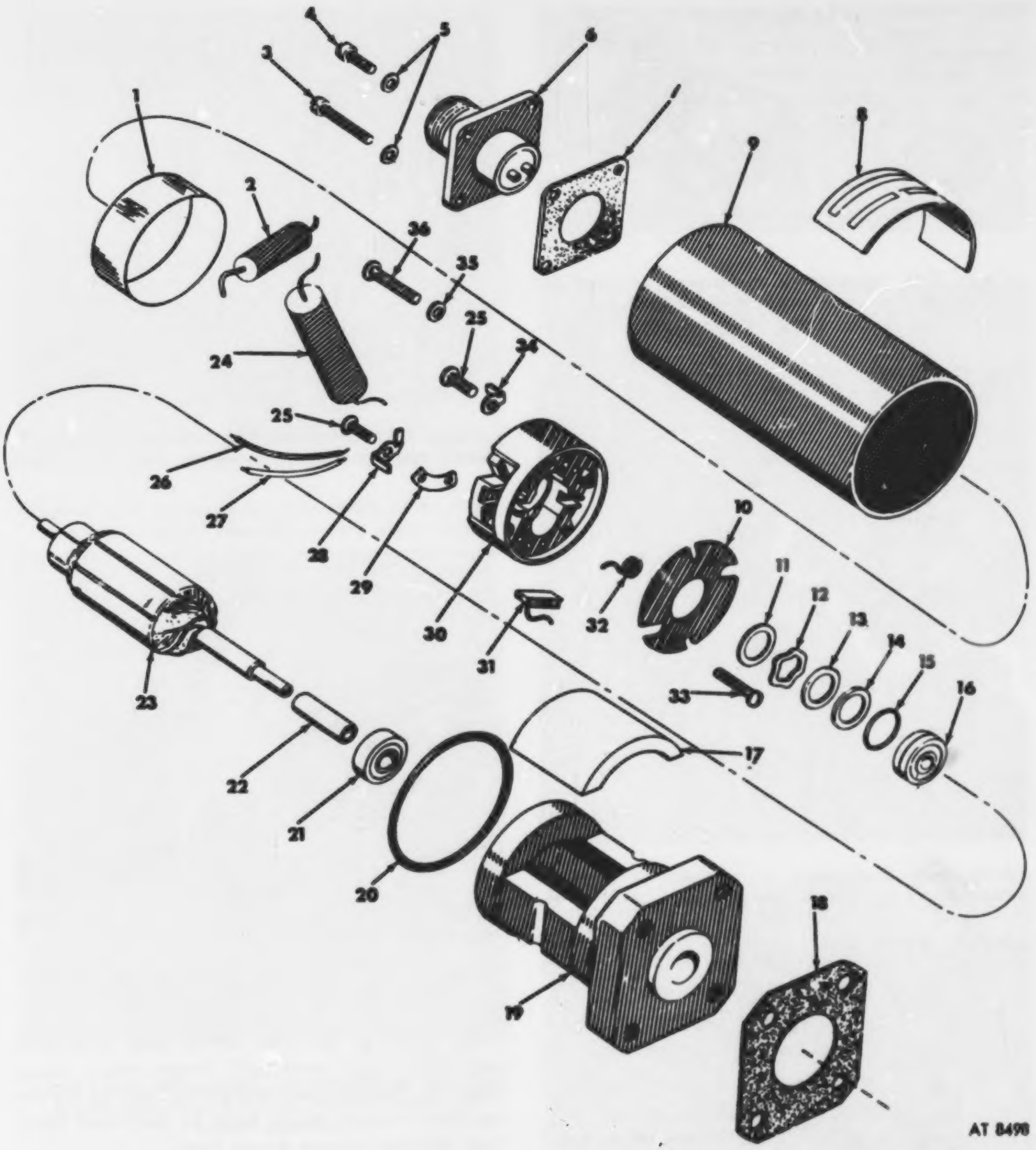

MOTOR FRAME
ARMATURE
PACKING
AT 9497

Figure 6–58. Disassembly or assembly of manifold heater fuel pump assembly—motor frame.

card packing. Remove drive spur gearshaft and idler spur gearshaft from rotary pump housing. Remove four assembled washer screws securing rotary pump base to electrical housing. Remove rotary pump base.

(6) Refer to figure 6–51. Remove and discard housing gasket from rotary pump base or electrical housing. Pry out large plain seal from rotary pump base. Discard seal.

(7) Refer to figure 6–52. Pry out retaining ring from rotary pump base and discard retaining ring. Pry out small plain seal and discard seal.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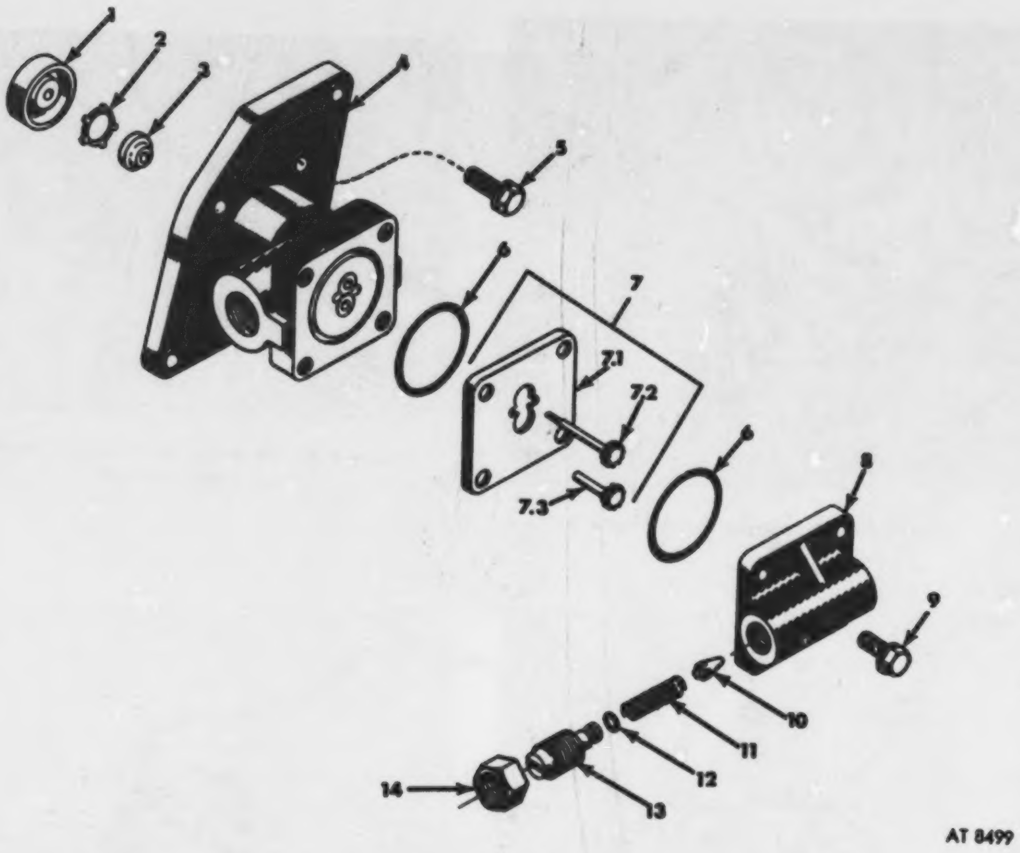
AT 8498

1 Electrical insulator
2 Choke coil
3 Panhead machine screw
4 Panhead machine screw
5 Machine screw seal washer
6 Connector receptacle
7 Connector receptacle gasket
8 Pump identification plate
9 Motor cover
10 Insulator
11 Shim
12 Spring washer
13 Shim
14 Shim
15 Preformed packing
16 Ball bearing
17 Field magnet
18 Housing gasket
19 Motor frame
20 Preformed packing
21 Ball bearing
22 Bearing spacer
23 Armature
24 Capacitor
25 Roundhead screw
26 Lead (black wire)
27 Lead (red wire ground)
28 Electrical terminal
29 Bus bar
30 Rotating housing assembly
31 Brush
32 Brush spring
33 Panhead machine screw
34 Electrical terminal
35 Flat washer
36 Panhead machine

Figure 6–59. Flame heater fuel pump assembly—exploded view.



1	Large plain seal
2	Retaining ring
3	Small plain seal
4	Rotary pump base
5	Assembled washer screw
6	Preformed packing
7	Gear and housing assembly
7.1	Gear housing
7.2	Spur gearshaft, drive
7.3	Spur gearshaft, idler
8	Relief valve housing
9	Assembled washer screw
10	Relief valve
11	Valve spring
12	Preformed packing
13	Relief valve adjusting screw
14	Checknut

Figure 6-60. Rotary fuel pump—exploded view.

(8) Refer to figure 6-53. Remove four panhead machine screws and four seal washers securing connector receptacle to motor cover.

(9) Refer to figure 6-54. Partially pull off connector receptacle from motor. Unsolder red wire from terminal marked "A" of connector receptacle. Unsolder terminal marked "B" of connector receptacle. Remove and discard connector receptacle gasket. Remove connector receptacle.

(10) Refer to figure 6-55. Twist motor cover clockwise to release and remove from preformed packing. Scribe alinement marks on electrical rotating housing and motor frame to ensure proper alinement during assembly. Remove two field magnets.

(11) Refer to figure 6-56. Pull back on the brush spring. Roll the brush out just far enough to clear the commutator. Hold brushes in raised position with spring resting against brush. Holding brushes with spring will prevent brushes from striking ball bearing on end of commutator during electrical housing removal. Perform the same procedure to remove the remaining brush.

(12) Refer to figure 6-56. Remove two roundhead screws securing electrical rotating housing to motor frame. Remove electrical ro-

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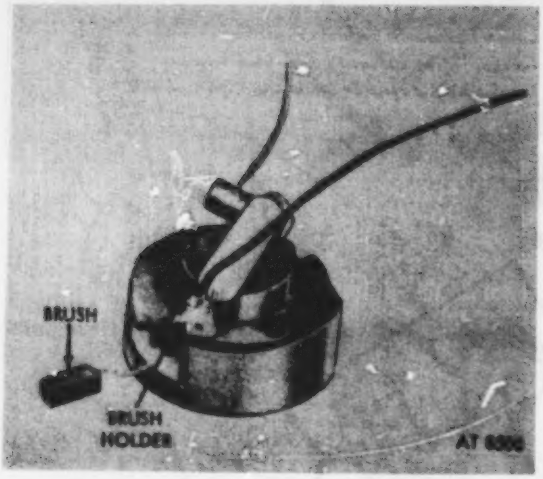

BRUSH
BRUSH HOLDER

Figure 6–61. Measuring brush length.

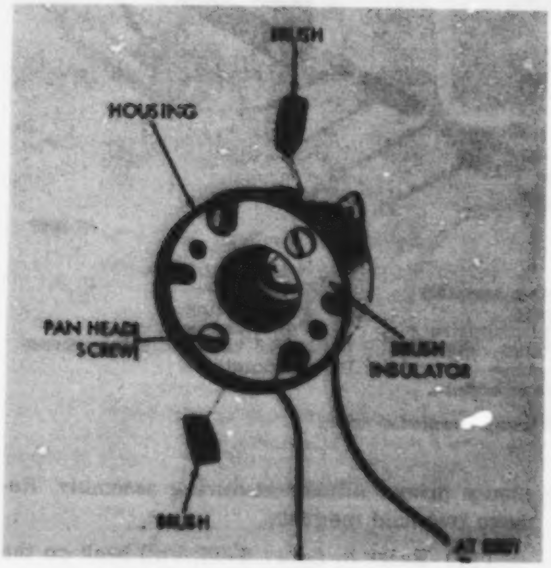

BRUSH
HOUSING
PAN HEAD SCREW
BRUSH INSULATOR
BRUSH

Figure 6–62. Removing or installing brush holder insulator.

tating housing and associated parts from motor frame.

(13) Refer to figure 6–57. Remove magnetized spring washer from ball bearing. Remove shims from electrical rotating housing. Count number of shims used and retain for assembly.

(14) Refer to figure 6–58. Remove armature and preformed packing from motor frame.

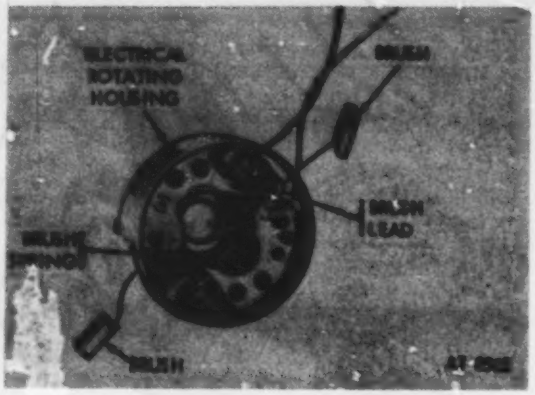

ELECTRICAL ROTATING HOUSING
BRUSH
BRUSH LEAD
BRUSH SPRINGS
BRUSH

Figure 6–63. Removing or installing brushes and brush springs.

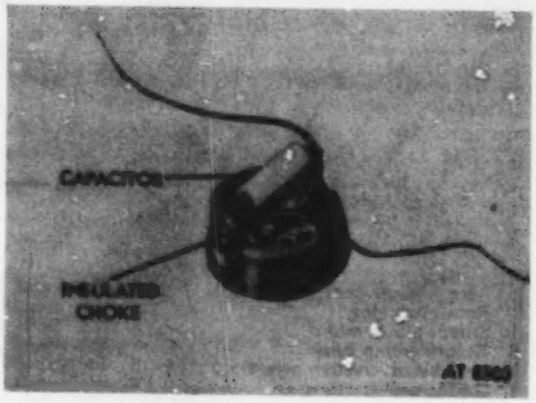

CAPACITOR
INSULATED CHOKE

Figure 6–64. Removing or installing capacitor and choke coil.

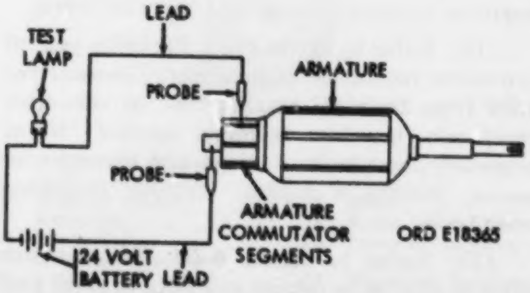
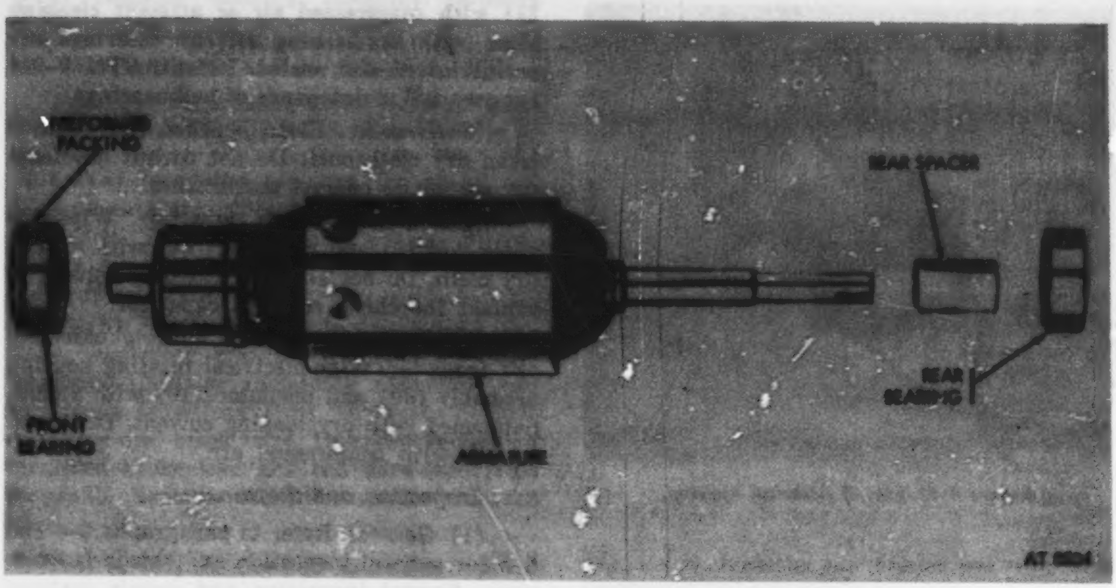
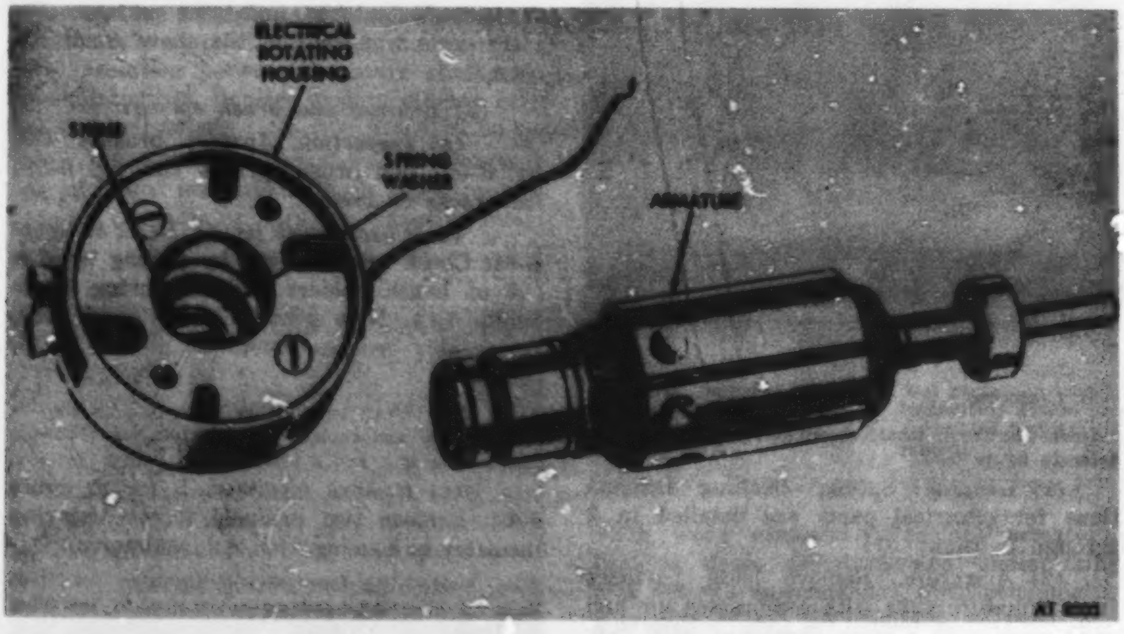

LEAD
TEST LAMP
PROBE
ARMATURE
PROBE
ARMATURE COMMUTATOR SEGMENTS
ORD E18365
24 VOLT BATTERY
LEAD

Figure 6–65. Testing armature for grounds using test lamp.



PREFORMED PACKING
REAR SPACER
REAR BEARING
FRONT BEARING
ARMATURE
AT

Figure 6–66. Removing or installing armature ball bearings and spacer.



ELECTRICAL ROTATING HOUSING
SHIM
SPRING WASHER
ARMATURE
AT

Figure 6–67. Positioning armature in electrical housing.

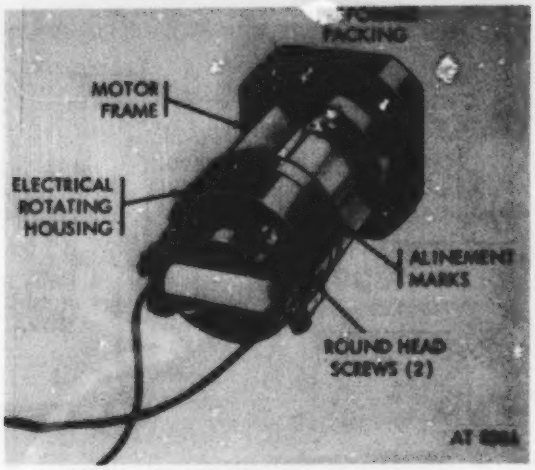


Figure 6–68. Install electrical housing.

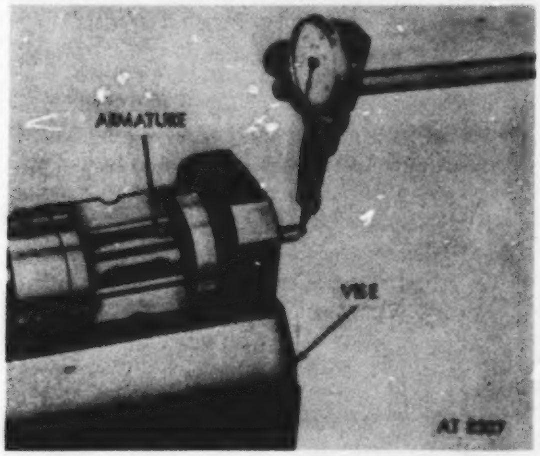


Figure 6–69. Checking armature end play using dial indicator.

b. *Cleaning.*

Note. The key numbers shown below in parentheses refer to figure 6–59.

(1) *General.* Special cleaning instructions for electrical parts are detailed in 2 through 5 below.

(2) *Armature.* Remove loose particles from armature (23) with compressed air and wipe clean with a cloth dampened with drycleaning solvent. Clean commutator lightly with No. 00 sandpaper and remove all traces of dust, with compressed air.

***Caution:* Do not spin ball bearings (16 and 21) with compressed air or attempt cleaning them with drycleaning solvent. Bearings are prelubricated and sealed. Refer to TM 9–214 for care and maintenance of ball bearings.**

(3) *Brushes.* Clean brushes (31) with a clean dry cloth only. Do not permit drycleaning solvent to contact the brushes.

(4) *Choke coil and capacitor.* Wipe the choke coil (2) and capacitor (24) with a clean dry cloth. Do not allow drycleaning solvent to contact the choke coil and capacitor.

(5) *Electrical rotating housing assembly and insulator.* Wipe electrical rotating housing assembly (30) and insulator (10) with a cloth dampened with drycleaning solvent. Dry thoroughly with compressed air.

c. *Inspection and Repair.*

(1) *General.* Refer to paragraphs 6–4 and 6–5 for general inspection and repair instructions. Special inspection and repair instructions are listed in 2 through 5 below.

(2) *Relief valve housing.* Inspect the relief valve (10, fig. 6–60) and the valve seating area in the relief valve housing (8, fig. 6–60) for scores, scratches, and wear patterns. Replace parts when any of the above conditions exist.

(3) *Brushes and brush springs.*

(a) *Inspection.* Inspect brushes (31, fig. 6–59) and brush springs (32, fig. 6–59) for cracks or breaks.

(b) *Check brush length.* Refer to figure 6–61. Check brush length by pulling brushes out of brush holders and measuring brush length (A). New brushes are ⅜-inch long. Serviceable brushes should be at least 5/16-inch long.

Note. When brushes are worn to 5/16 inch or less, remove and replace the two brushes, following instructions in c and d below.

(c) *Remove insulator.* Refer to figure 6–62. Remove two panhead screws securing insulator to housing. Remove insulator.

Note. Aline four holes in insulator with four holes in electrical rotating housing when installing insulator.

(d) *Remove brushes and brush springs.* Refer to figure 6–63. Unsolder brush leads from terminals. Remove brushes from electrical rotating housing assembly. Remove brush springs from brush holders.

(4) *Choke coil and capacitor.*

Note. The key numbers shown below in parentheses refer to figure 6–59 except where otherwise indicated.

(a) *Inspection.* Inspect the choke coil (2) and capacitor (24) for frayed or cracked insulation. Test the insulated choke for continuity using a continuity tester. Remove either if defective.

(b) *Removal.* Refer to figure 6–64. Unsolder capacitor and choke coil leads from terminal. Unsolder remaining capacitor lead and black wire lead from terminal. Remove capacitor and black wire. Unsolder remaining insulated choke lead and red wire lead from terminal. Remove insulated choke and red wire.

(5) *Armature and ball bearings.*

(a) *Testing armature for grounds.* Test the armature for grounds as shown in figure 6–65. Use a 24-volt dc test lamp, and contact one lead to end of armature shaft. Touch each commutator bar in turn with the other lead. When test lamp lights, as one individual bar is connected, a short circuit exists in the armature insulation between armature shaft and commutator bar. Replace armature when bars are short-circuited.

(b) *Cleaning armature commutator bar and mica insulation.* Check brush contact area on commutator bars for excessive wear. When worn excessively, replace armature. Turning down armature and undercutting mica are not recommended when commutator is damaged. Clean the insulation between commutator bars by carefully running a sharp knife blade between the bars. Cleaning grooves will remove any possible brush carbon or metal filings which would possibly short out bars.

ARBOR PRESS
IMPROVISED TOOL
PUMP BASE

Figure 6–70. Installing small plain seal in pump base.

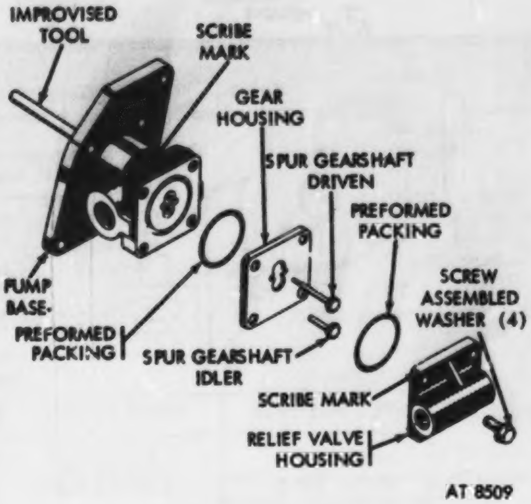
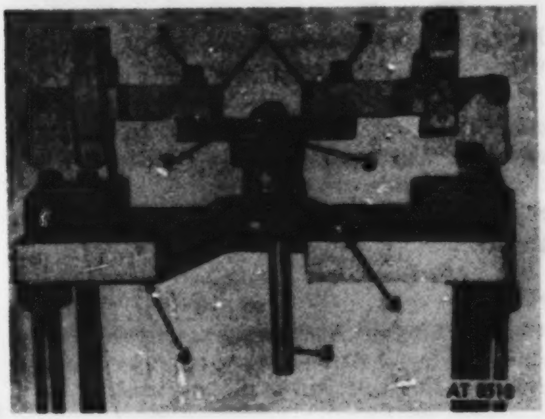
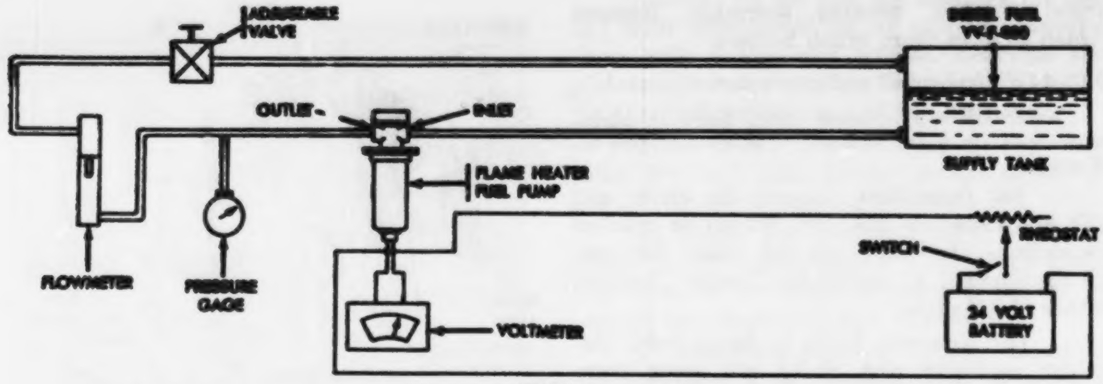

IMPROVISED TOOL
SCRIBE MARK
GEAR HOUSING
SPUR GEARSHAFT DRIVEN
PREFORMED PACKING
SCREW ASSEMBLED WASHER (4)
PUMP BASE
PREFORMED PACKING
SPUR GEARSHAFT IDLER
SCRIBE MARK
RELIEF VALVE HOUSING
AT 8509

Figure 6–71. Installing gear housing and relief valve housing on pump base.



1 Clamp, improvised tool
2 Adjusting screw
3 Gear housing
4 Pump base
5 Seal protection tool
6 Improvised fixture
7 Assembled washer screws

Figure 6–72. Centering gear housing on pump base.



TESTS

INPUT VOLTAGE	INPUT CURRENT	OUTPUT PRESSURE	OUTPUT FLOW
14VDC ± 0.5 29VDC ± 0.5	3.0 amps max 3.0 amps max	90 psi ± 5 120 psi ± 5 150 psi max	3.5 GPH min 3.75 GPH min Set at zero flow

AT 8511

Figure 6–73. Fuel pump test equipment.

Remove two ball bearings and spacer (c below) to replace a damaged or defective armature.

(c) *Removing armature ball bearings and spacer*. Refer to figure 6–66. Remove front and rear ball bearings using a suitable bearing puller. Remove rear bearing spacer. Remove front ball bearing and discard preformed packing.

(d) *Inspecting ball bearings*. Inspect the front and rear armature ball bearings (fig. 6–66) for roughness or uneven rolling action. When ball bearings are unserviceable, replace ball bearings.

d. *Assembly*.

(1) Install armature and electrical housing as follows:

(a) Refer to c.(5)(c) above and figure 6–66. Reverse the sequence of instructions to install spacer and ball bearings on shaft.

(b) Refer to figure 6–67. Install the same number of shims as were removed during disassembly (a.(13) above). Install the spring washer. Position the armature in the electrical rotating housing, against the spring washer.

Note. Armature end play is controlled by these shims. The amount of shims and thickness of shim pack cannot be determined at this stage of assembly. Refer to 2 below.

(c) Refer to figure 6–68. Position motor frame so alinement mark (made at disassembly) alines with alinement mark on the electrical rotating housing. Install two roundhead screws. Install preformed packing on housing.

(2) Check armature end play as follows: Mount armature and associated parts in a soft-jawed vise. Set up a suitable dial indicator so arm rests on armature shaft. Slide armature back and forth and take end play reading on dial indicator. Correct end play should be from 0.003 to 0.005 inch.

Note. When end play is not between 0.003 inch and 0.005 inch, partially disassemble pump motor as shown in figure 6–67. Add or subtract spacer shims as required until proper end play is established.

(3) Refer to a.(8) through (10) above and reverse the sequence of instructions to install the field magnets, motor cover, and connector receptacle.

(4) Install the small plain seal (3, fig. 6–60) and large plain seal (1, fig. 6–60) in rotary pump base (4, fig. 6–60) and install rotary pump base as follows:

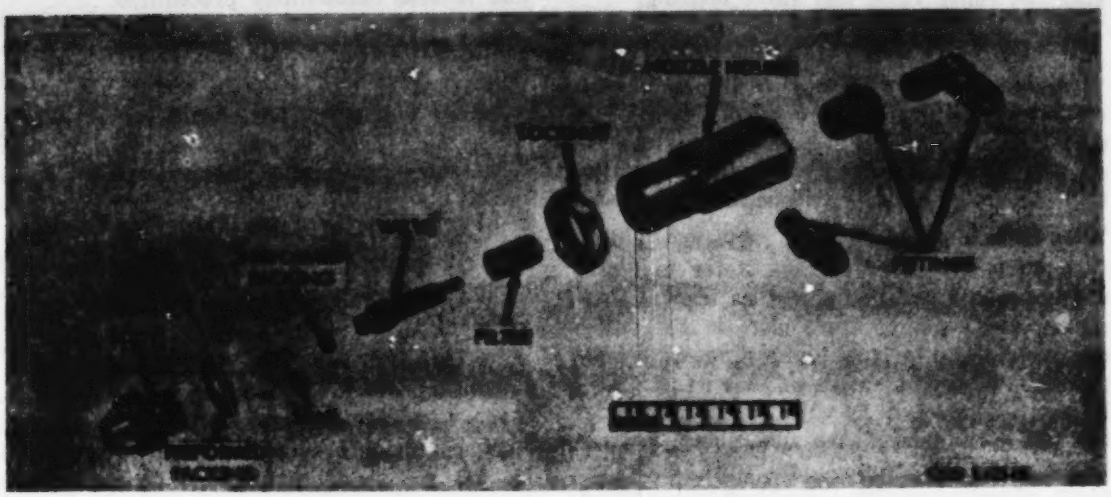


Figure 6-74. Manifold heater injector nozzle—exploded view.

(a) Refer to figure 6-70. Lubricate small plain seal and install in bore in pump base. Using improvised installation tool (fig. 2-14) and an arbor press, seat seal in bore.

(b) Install retaining ring (fig. 6-52) to secure small plain seal.

(c) Install large plain seal (fig. 6-51) in bore of pump base, using an arbor press.

(d) Refer to figure 6-71. Install recessed end of improvised seal protection tool (fig. 2-13) through large and small seals until tool bottoms in bore. Install spur gearshaft and spur gear in pump base. Install preformed packing in recess in pump base. Aline scribe marks (fig. 6-46) and install gear housing on pump base. Install preformed packing in relief valve housing. Aline scribe marks (fig. 6-46) and install relief valve housing on gear housing. Secure relief valve housing to pump base with four assembled washer screws. Do not tighten screws.

Note. Screws will be tightened after gear housing has been properly centered.

(e) Refer to figure 6-72. Install pump base in improvised fixture (fig. 2-11) as shown. Carefully remove seal protection tool from seal base. Center gear housing and turn spur gearshaft. Gears must turn freely with no evidence of binding. When gear housing is centered and gears turn freely, clamp gear housing in position with two clamps and adjusting screw. Tighten four assembled washer screws to a torque of 10 to 12 inch-pounds. After tightening screws, again check gear rotation. Gears must turn freely. Remove pump base from improvised fixture.

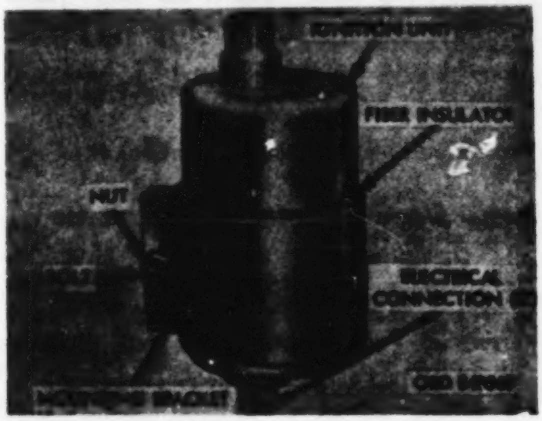


Figure 6-75. Ignition unit and mounting bracket.

(f) Install new housing gasket (fig. 6-51) on pump base. Install pump base on electric motor and secure with four assembled washer screws (5, fig. 6-60)

(g) Refer to a.(2) above and figure 6-

47. Reverse the sequence of instructions to install the relief valve and valve housing.

e. *Tests.*

Caution: **The flame heater fuel pump electrical system is negative-grounded. Pin "A" is positive and pin "B" is negative. Do not reverse polarity of pump during checking or installation. Reversing polarity will permanently damage pump.**

(1) *Relief valve setting.* Refer to figure 6–73. Connect test equipment as shown. Connect a 0–200-psi pressure gage to the outlet of the flame heater fuel pump. Connect a hose from the inlet to a source of diesel fuel (VV-F-800). Connect a 24-volt power supply to the two terminals of the fuel pump. Loosen checknut (14, fig. 6–60) and turn the relief valve adjusting screw (13, fig. 6–60) until a reading of 90 to 100 psi is obtained on the pressure gage. Lock the relief valve adjusting screw with checknut (14, fig. 6–60).

(2) *Flow tests.* Connect the flame heater fuel pump as shown in figure 6–73. Adjust the rheostat to give the input voltages as shown on figure 6–73. The output pressure and output flow must meet the requirements shown.

6–80. Manifold Heater Injector Nozzle

a. *Disassembly.* Refer to figure 6–74. Remove body, preformed packing, and locknut from nozzle holder. Remove filter, valve preformed packing and seat from body. Remove fittings from holder.

b. *Cleaning.* Thoroughly clean all parts in drycleaning solvent or mineral spirits paint thinner. Clean passages and blow dry with low-pressure compressed air.

c. *Inspection.* Check filter screen for tears or obstructions. Inspect nozzle holder for cracks and stripped thread bores.

d. *Repair.* Repair threaded bores in nozzle holder with suitable thread tap. Replace holder if cracked. Replace complete assembly when operation check (see f below) shows inadequacy.

e. *Assembly.* Parts must be thoroughly clean and dry before assembly. Refer to a above, and reverse disassembly procedures.

f. *Test.* After heater nozzle has been assembled, connect to heater fuel pump. Actuate pump and check nozzle assembly for leaks. Fuel must be sprayed from nozzle in a fine mist.

6–81. Ignition Unit and Mounting Bracket

a. *Disassembly.* Remove bolt and nut securing ignition unit in mounting bracket. Remove ignition unit and fiber insulator from mounting bracket. Refer to figure 6–75 for parts identification and location.

b. *Cleaning and Inspection.* Thoroughly clean mounting bracket in drycleaning solvent or mineral spirits paint thinner. Check brackets for cracks and bent condition. Wipe ignition unit with a cloth moistened with drycleaning solvent. Do not immerse unit in solvent. Check ignition unit for dents or cracks and broken electrical connections.

c. *Tests.* Connect the spark plug and the spark plug lead to the ignition unit. Ground the spark plug shell to provide a complete electrical circuit. Apply 14.30 volts dc to the ignition "A" pin. The "B" pin is grounded. If the ignition unit is in good working order, the spark plug will fire with a clean, snapping sound. If the spark plug does not fire correctly, replace spark plug and repeat the above test. If it still does not fire correctly, replace the ignition lead and repeat the test procedure. If is still does not fire properly, replace ignition unit.

Caution: **No not attempt to test ignition unit by jumping spark from end of lead to the ground. High voltage will destroy the contact spring in terminal end.**

d. *Repair.* Replace the ignition unit when cracked, dented, or if it fails to pass continuity test (c above). Replace unit if electrical connections are bent or broken. Straighten minor distortions of mounting bracket. Replace bracket if cracked or broken.

e. *Assembly.* Reassemble the ignition unit and mounting bracket in reverse order of disassembly (a above).

Section XVII. REPAIR OF WATER PUMP

6–82. General

This section covers disassembly, cleaning, inspection, repair, and assembly of the water pump assembly. Repair is limited to replacement as a service assembly, or rebuilding by means of a rebuilding kit. Install new seal and gasket when rebuilding pump assembly.

6–83. Disassembly

Note. The key numbers shown below in parentheses refer to figure 6–76.

a. Remove seven capscrews (22) and seven lockwashers (23) securing water pump cover (13) to water pump housing (3).

b. Separate pump cover (13) from pump housing (3) and discard gasket (4).

c. Remove nut (21) securing water pump pulley hub (20) to water pump shaft (7). Remove pulley hub (20) and key (8) from water pump shaft (7).

d. Remove impeller (5) from pump shaft (7) by tapping the two ¼ holes in the impeller with a 5/16–18 NC tap. Use a suitable puller attached to these two holes to remove impeller.

***Caution:* Do not use any other puller, such as the common jaw type, on the outer edges of impeller. Other pullers, when applied to impeller outer edges, could crack the casting.**

e. Remove retaining snapring (19) from pump cover (13). Using arbor press, press shaft (7), bearings (15 and 18), spacer (17), and oil slinger (14) assembly from pump cover (13).

f. Remove seal (6) from the rear of pump cover (13). Remove preformed packing (16) from cover (13).

g. Remove water pump drain valve (9), elbows (1) and (2), and pipe slug (10), from water pump housing (3).

6–84. Cleaning

Clean all water pump parts except bearings (15 and 18) thoroughly with drycleaning solvent or mineral spirits paint thinner. Clean scale deposits from inside body using a scraper or stiff wire brush. Thoroughly clean all gasket surfaces of body and housing. Dry all parts with low-pressure compressed air.

Caution: Do not spin bearings (15 and 18) with compressed air or attempt cleaning them with drycleaning solvent. Refer to TM 9–214 for care and maintenance of ball bearings.

6–85. Inspection

Inspect pump cover for cracks, damaged gasket surfaces, and damaged bearing bores. Inspect water pump impeller for broken blades and damaged shaft bore. Check water pump housing for cracks, damaged gasket surfaces, and damaged bearing bores. Check water pump shaft for wear, stripped threads, and damaged keyway. Check plugs and fittings for breaks or evidence of leakage.

6–86. Repair

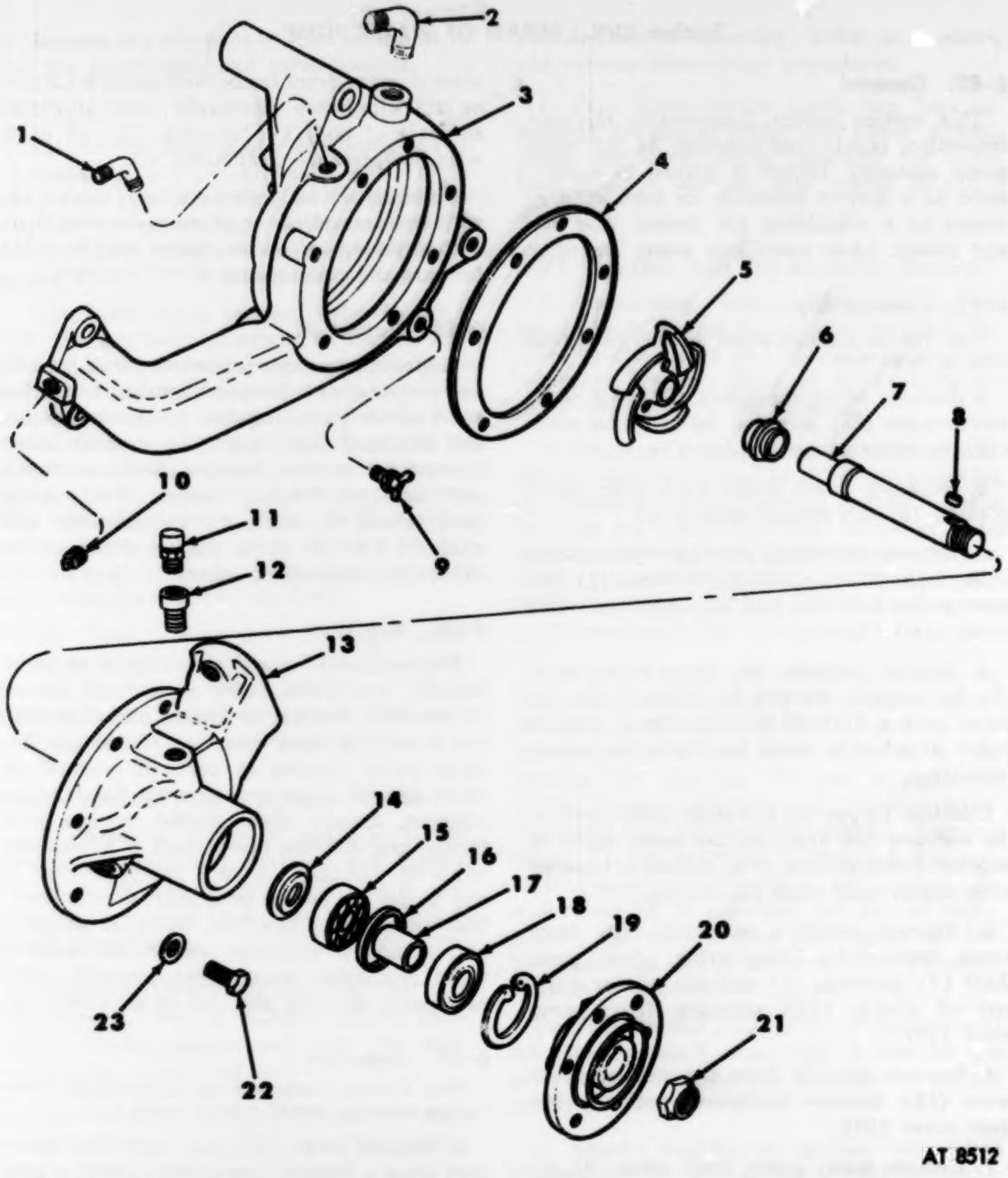
Remove burrs on mating surfaces of pump housing and cover, using a fine mill file or crocus cloth. Replace all fittings and plugs that are broken or show evidence of leakage. Replace pump housing or cover if cracked, or when thread bores are severely damaged or stripped. Repair minor thread damage with thread tap. Replace pump shaft if excessively worn or damaged. Replace pump impeller if any blades are broken or if shaft bore is worn. The water pump bearings, seals, oil slingers, and retaining snapring should be replaced when rebuilding water pump assembly with new parts that are supplied as a rebuild kit.

6–87. Assembly

Note. The key numbers shown in parentheses below (unless otherwise noted) refer to figure 6–76.

a. Repack front (15) and rear (18) bearings using a lithium base grease. Install a new preformed packing (16) in water pump cover (13).

b. Slide rear bearing oil slinger (14) onto shaft (7) with its flange side facing the impeller (5) end of shaft. Slide the smaller rear bearing (15) onto shaft with bearing's seal side also facing the impeller end of shaft (7).



1	Manifold bypass elbow
2	Oil cooler return elbow
3	Water pump housing
4	Gasket (cover to housing)
5	Impeller
6	Seal, rear bearing
7	Water pump shaft
8	Key, fan hub
9	Valve, water pump drain
10	Pipe plug
11	Breather
12	Reducer
13	Cover, water pump
14	Oil slinger, rear bearing
15	Rear bearing
16	Preformed packing (rear bearing)
17	Spacer, bearing
18	Front bearing
19	Retaining snapring
20	Hub, water pump pulley
21	Nut, fan hub
22	Capscrew, water pump cover
23	Lockwasher, water pump cover

Figure 6-76. Water pump assembly—exploded view.

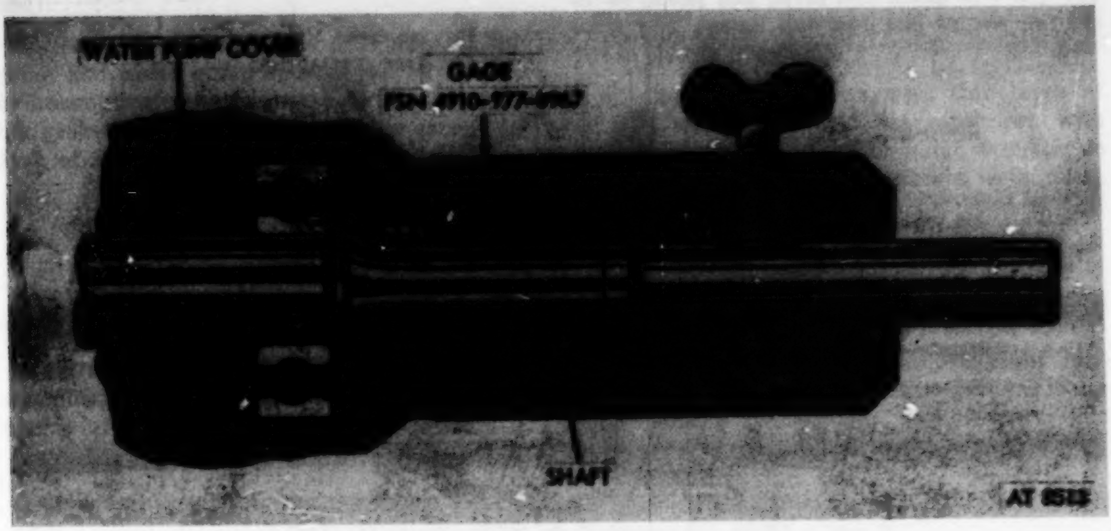


Figure 6-77. Using setting gage to determine correct clearance.

Figure 6-78. Using spacer and shims to attain desired fit of impeller.

Position bearing spacer (17) along with front bearing (18) onto shaft, making sure that bearing (18) seal side faces toward hub (20) end of shaft. Using a special bearing replacer tool with arbor press, press against inner race of front bearing (18). This secures above parts into place on shaft.

c. Pack space between rear (15) and front (18) bearings with a lithium base grease so that cavity in water pump cover (13) will be approximately ⅓ full.

d. Place lubricated shaft (7) and bearing (15 and 18) assembly into cover (13) being careful not to dislodge the packing (16). Using special bearing replacer tool 1164477 with an arbor press to the front bearing (18) outer race, press assembly into proper position in cover (13).

e. Install a new bearing retainer ring (19) with the tapered side facing outward.

f. To prevent contamination of lubricant, make sure breather (11) is installed in reducer (12) which is secured to cover (13).

g. Apply a thin coating of oil and water sealer to outside of impeller seal (6) below the stop flange only. Using special bearing replacer 11644677, large end, press seal (6) into water pump cover (13) (press only on flange). Seat firmly and wipe off any excessive oil and water sealer.

Caution: Do not press on ceramic face of seal.

h. Determine and secure impeller clearance in the cover, using gage FSN 4910-977-8967 as follows:

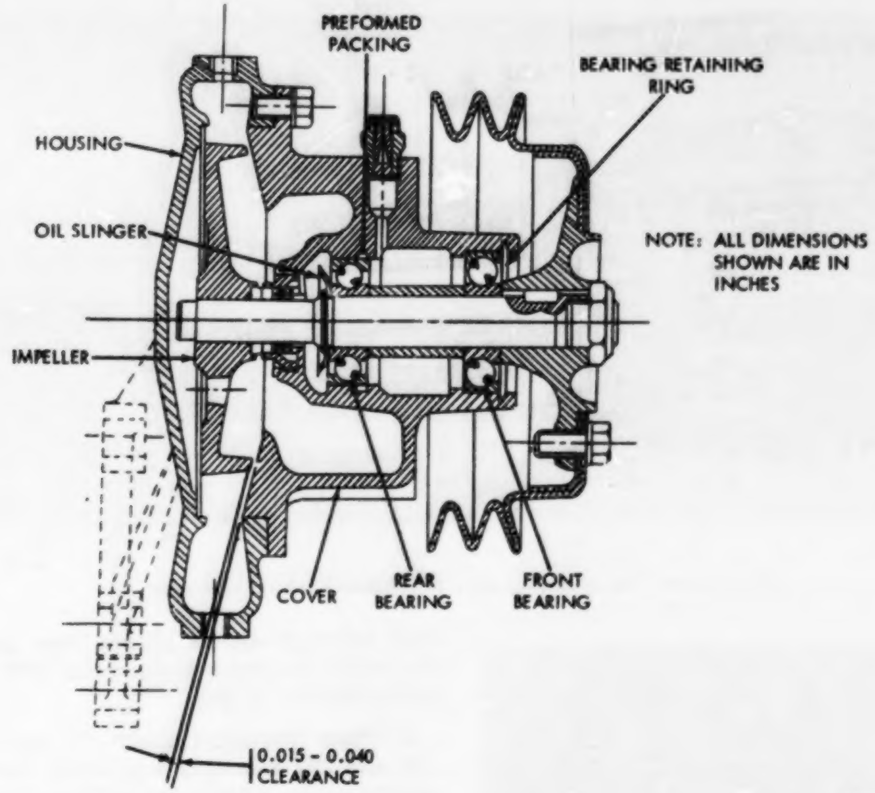


Figure 6–79. Water pump assembly—rebuild clearances.

(1) Loosen gage thumbscrew and slide gage onto shaft until gage bottoms on the cover (fig. 6–77). Slide loose pin into gage until pin bottoms on end of the shaft securing gage tight to the cover. Lock the thumbscrew.

(2) If a new impeller is being installed, remove the protective coating from ceramic face of the hub. Slide locked gage into impeller from the seal face side fully. The gage pin should protrude from the impeller.

(3) Select one of the three spacers supplied with gage which comes closest to being flush with, but not over, the end of shaft. Additional shims might be required to secure desired flush fit (fig. 6–78).

(4) The selected spacer and shims will be used when pressing impeller onto shaft.

i. Wipe both the face of the seal and the ceramic face clean. Apply a light coating of petrolatum to seal facing. Do not allow any lubricant to remain on shaft or in the impeller bore. Start pressing impeller squarely onto shaft. Stack the selected spacer and shims on the impeller. Using a flat end arbor press, force impeller onto shaft until it is nearly seated. Check to make certain that there is sufficient clearance between impeller and cover. If clearance measures correctly, continue pressing until arbor press bottoms on the shaft. Remove spacer.

***Caution:* Support water pump in arbor press by end of the shaft, not by the cover. This prevents damaging the bearings.**

j. Check clearance between the impeller and cover. Clearance should be between a minimum of .015 inches to a maximum of .040 inches (fig. 6–79). If impeller is closer than .015 inches, use two 5/16–18 NC screws with puller to pull impeller back on the shaft (par. 6–83d).

k. The clearance between rear face of impeller and water pump housing can be checked by assembling cover to housing without installing gasket. Shaft should turn freely except for drag of seal. Remove cover from housing.

l. Support the impeller end of shaft in an arbor press, and press hub using new key (8) to secure. Install hub nut and torque nut between 238 to 264 lb ft.

m. Coat six capscrews with thin layer of oil and water seal, and use capscrews with lockwashers to secure water pump assembly to housing, making sure new gasket is in place.

Section XVIII. REPAIR OF TIMING GEAR COVER

6–88. General

This section of the manual covers the disassembly, cleaning, inspection, repair, and assembly of the timing gear cover assembly.

6–89. Disassembly

Refer to figure 6–80. Remove eight capscrews and eight lockwashers securing injector pump timing access cover. Remove cover and

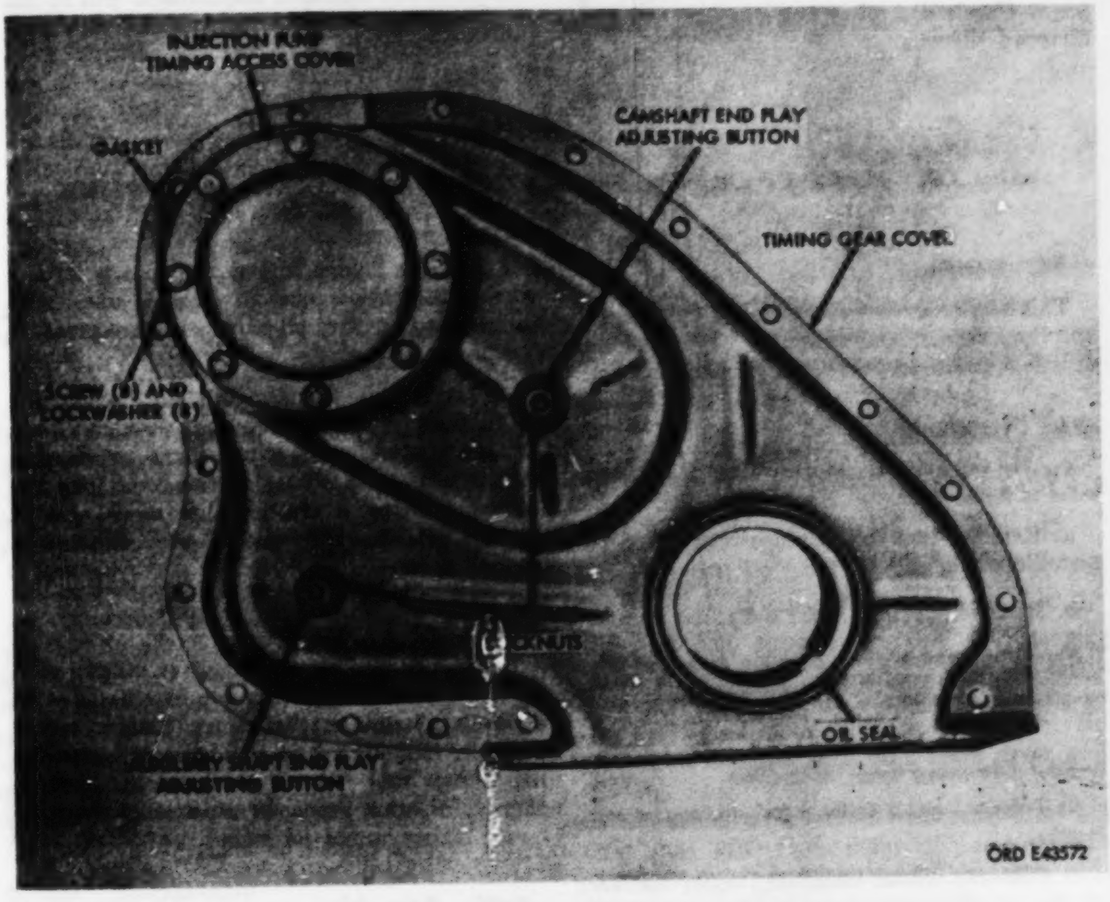

INJECTION PUMP
TIMING ACCESS COVER
GASKET
CAMSHAFT END PLAY
ADJUSTING BUTTON
TIMING GEAR COVER
SCREW (8) AND
LOCKWASHER (8)
LOCKNUTS
OIL SEAL
AUXILIARY SHAFT END PLAY
ADJUSTING BUTTON
ORD E43572

Figure 6–80. Timing gear cover assembly.

gasket. Discard gasket. Remove locknuts from end play adjusting buttons, and remove buttons. Drive oil seal out of timing gear cover from the back side of cover assembly. Discard seal. Make sure oil seal bore in housing is not damaged.

6–90. Cleaning

Thoroughly clean all parts in drycleaning solvent or mineral spirits paint thinner. Make sure all gasket surfaces are free of old gasket material.

6–91. Inspection

Inspect timing gear cover and access cover for cracks, dents, or elongated screw holes. Check tapped holes for stripped threads. Inspect gasket surface for deep gouges and warpage. Check end play buttons for wear and stripped threads.

6–92. Repair

Replace covers if cracked, warped, or damaged. Remove minor nicks, burrs, or scratches from gasket surfaces with crocus cloth or fine mill file. Replace end play buttons if worn or if threads are stripped.

6–93. Assembly

Press new seal into timing gear cover from front side, using suitable replacer tool. Temporarily install injection pump timing access cover without gasket, and secure with eight lockwashers and capscrews. Cover must be removed to time injection pump (refer to paragraph 10–2 for injection pump timing procedures). After injection pump is timed, install the cover gasket. Install end play adjusting buttons and locknuts. Adjustment will be made in reassembly of the engine.

Section XIX. REPAIR OF OIL PAN, DIPSTICK GUIDE AND BRACKET, AND DIPSTICK

6–94. General

This section covers disassembly, cleaning, inspection, repair, and assembly of the oil pan, dipstick guide and bracket, and dipstick.

6–95. Disassembly

Note. The key numbers below shown in parentheses refer to figure 6–81.

a. Remove two drain plugs (11) and two metallic washers (12) from oil pan (1).

b. Remove dipstick (par. 5–2).

Note. The dipstick guide assembly cannot be disassembled without damaging the components, and must be replaced as a unit.

6–96. Cleaning and Inspection

Note. Refer to figure 6–81 for parts identification and location.

a. *Cleaning.* Clean inner and outer surfaces of the oil pan and dipstick guide with drycleaning solvent or mineral spirits paint thinner. Remove sludge and gum deposits with a wire brush. Blow out all tapped holes with compressed air. Dry all parts with low-pressure compressed air.

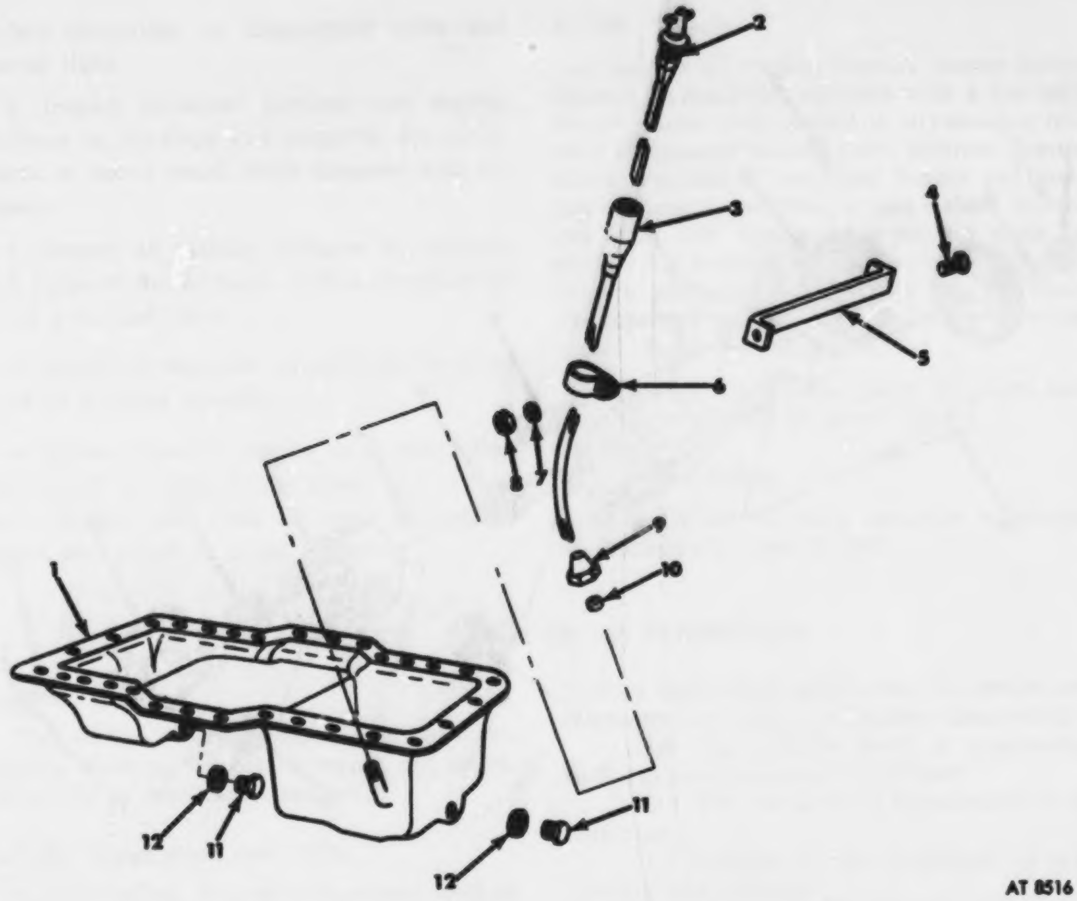
b. Inspection. Inspect oil drain plugs and drain holes in pan for damaged threads. Check oil pan gasket surface for nicks or damage that might cause oil leaks. Check oil pan for warpage, using a straightedge across gasket surface. Replace oil pan if any damage is beyond repair.

6–97. Repair

Correct minor thread damage on oil pan with a thread die or tap. Remove minor dents with a peening hammer. Straighten flanges where possible. Remove minor scratches or burrs using a fine mill file or crocus cloth. Replace oil pan, dipstick guide, or dipstick if satisfactory repairs cannot be made.

6–98. Assembly

Assemble the oil pan, dipstick guide and



1 Oil pan
2 Dipstick
3 Dipstick guide
4 Capscrew
5 Bracket, dipstick guide
6 Clamp, dipstick guide
7 Lockwasher
8 Nut
9 Nut, dipstick guide
10 Ferrule
11 Plug, oil pan drain
12 Washer, metallic

Figure 6-81. Oil pan, and dipstick guide—exploded view.

Section XX. REPAIR OF OIL PUMP ASSEMBLY

bracket, and dipstick when reassembling engine (par. 9-21).

6-99. General

This section covers procedures for disassembly, cleaning, inspection, repair, and assembly of the oil pump assembly.

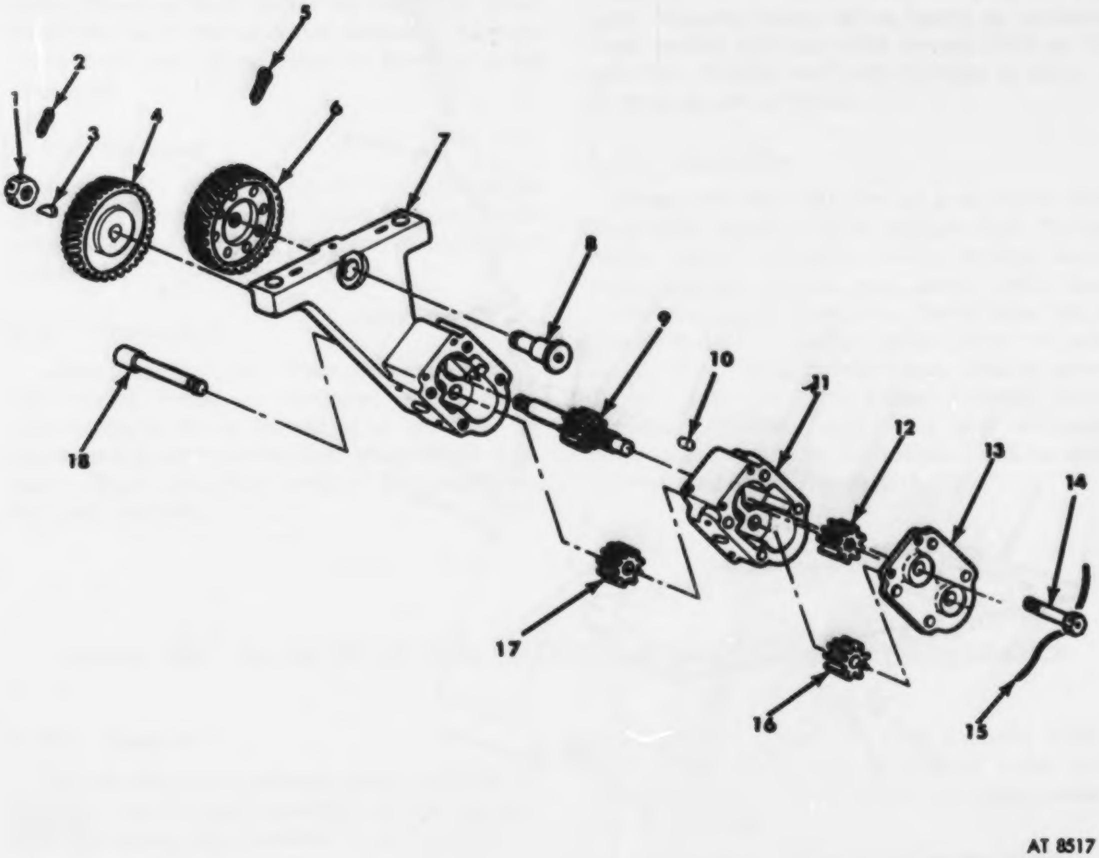
6-100. Disassembly

Note. Key numbers in a through d below appear on figure 6-82.

a. Cut and remove lockwire (15) locking four capscrews (14) securing cover. Remove four capscrews 14) from cover (13). Remove cover (13) and two locating pins (10). Remove two locating pins (10) from cover only if loose.

b. Remove oil pump driven gear (12) and idler gear (16) from main oil pump housing (11). Remove main oil pump housing (11) from scavenger pump housing (7).

c. Remove cotter pin (2) from gear re-



1 Nut, gear retainer
2 Pin, cotter
3 Key, driving gear
4 Gear, oil pump drive
5 Pin, cotter
6 Gear, idler, oil pump
7 Housing, oil pump (scavenger)
8 Shaft, idler gear
9 Shaft, driving, oil pump
10 Pin, cover locating
11 Housing, oil pump (main)
12 Gear, driven, oil pump
13 Cover, oil pump housing
14 Capscrew, cover
15 Lockwire
16 Gear, idler, w/bushing
17 Gear, idler, w/bushing
18 Shaft, idler assembly

Figure 6–82. Oil pump assembly—exploded view.

tainer nut (1) and oil pump driving shaft (9). Remove gear retainer nut (1) from oil pump driving shaft. Remove oil pump drive gear (4), key (3), and oil pump driving shaft (9) from housing (7).

d. Remove cotter pin (5) from idler gear screw (8). Remove idler gear (6) from idler gear screw (8). Remove idler gear screw (8) from housing (7).

6–101. Cleaning

Clean all parts thoroughly with drycleaning solvent or mineral spirits paint thinner. Clean all oil passages with a stiff brush and probe to break up any sludge or gum deposits and to free all obstructions. Remove sludge and gum deposits from castings using a stiff brush. Blow out all tapped holes with compressed air and dry all castings, after cleaning, with compressed air.

6–102. Inspection

a. Inspect all castings for cracks, using magnaflux equipment, or magnifying glass and strong light.

b. Inspect machined surfaces and mating surfaces of housings and supports, for nicks, burrs, or raised metal. Mark damaged area for repair.

c. Inspect all mating surfaces on castings and supports for warpage, with a straightedge or on a surface plate.

d. Inspect all capscrew tapped holes for damaged or stripped threads.

e. Inspect gears for cracks, using magnaflux equipment or magnifying glass and strong light. Inspect gear teeth for wear, sharp fins, burrs, and galled or pitted surfaces.

6–103. Repair

a. Replace all cracked castings. Repair minor damage to machined surfaces with a fine mill file or crocus cloth soaked in drycleaning solvent or mineral spirits paint thinner. Repair minor warpage of mounting flanges and mating surfaces by working across a sheet of crocus cloth held tightly on a surface plate or similar flat surface. Repair damaged capscrew threads in tapped holes with a tap, or repair the threaded opening by installing a threaded insert. Refer to TB 9–256.

b. Replace all cracked gears or gears that have worn, pitted, or galled teeth.

6–104. Assembly

Assemble the oil pump assembly in reverse of disassembly (par. 6–100).

Section XXI. REPAIR OF AIR COMPRESSOR

6–105. General

This section covers procedures for the disassembly, cleaning, inspection, repair, and assembly of the air compressor assembly.

6–106. Description and Data

a. *Description.* The air compressor used on the Mack ENDT–673 engine has a water-cooled cylinder head and an air-cooled cylinder block. Lubrication is by the engine lubricating oil and is circulated through the air compressor into the attached power steering pump by the engine oil pump.

b. *Data.*

Manufacturer	Bendix-Westinghouse
Model	Tu Flo. 400
Number of cylinders	2
Piston displacement @ 1,250 rpm	7¼ cu ft per minute
Unloading device	internal

6–107. Disassembly

a. *Preliminary.*

(1) Clean exterior surface of air compressor.

(2) The following items should be marked to show their relationship when the compressor is reassembled prior to complete disassembly:

(a) The cylinder block in relationship to the cylinder head and crankcase.

(b) The end cover in relationship to the crankcase.

(c) Position of the crankshaft in relationship to crankcase.

b. *Cylinder Head (fig. 6–83).*

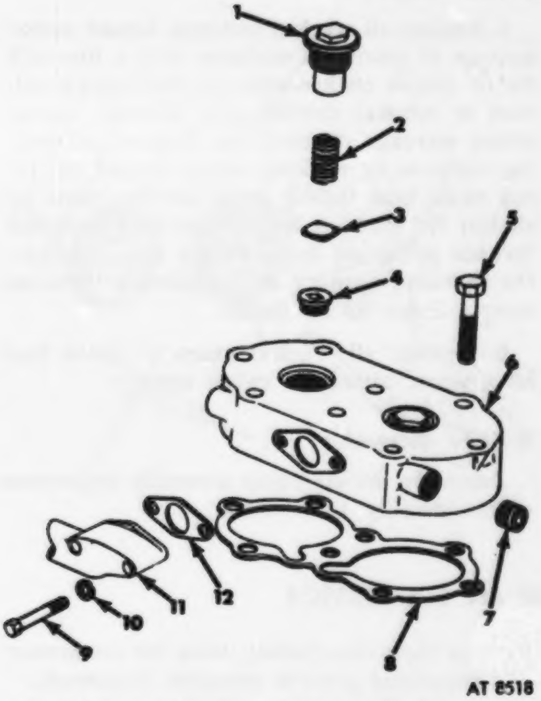
(1) Remove eight capscrews (5) securing cylinder head (6) to block, and remove head. If necessary for removal purposes, tap head loose with a soft-type hammer. Discard gasket (8).

(2) Remove two capscrews (9) and lockwashers (10) securing discharge fitting (11), and remove fitting. Discard gasket (12).

(3) Remove two discharge capnuts (1). Remove two discharge valve springs (2) and valves (3) from head (6). If valve seats (4) are badly worn or nicked, remove and replace them.

(4) Remove the two cylinder head coolant plugs (7) from head (6).

Note. After cylinder head has been removed from cylinder block, the exposed inlet valve springs and valves should be removed to prevent loss (refer to fig 6–86).



1 Discharge valve cap-nut
2 Discharge valve spring
3 Discharge valve
4 Discharge valve seat
5 Cylinder head cap-screw
6 Cylinder head
7 Coolant plug
8 Cylinder head gasket
9 Discharge fitting cap-screw
10 Discharge fitting lockwasher
11 Discharge fitting
12 Discharge fitting gasket

Figure 6-83. Air compressor cylinder head and discharge valve—exploded view.

c. *Piston and Rod Assemblies and Drive Couplings (fig. 6-84).*

(1) Remove nut (13) and washer (12) securing compressor drive coupling (11). Using a suitable puller attached to coupling (11) by two 5/16-18 NC screws, pull coupling (11) from crankshaft portion of cylinder block and crankcase assembly (9). Remove key (10).

(2) Remove nut (23) and washer (22) securing power steering pump drive coupling (21). Using a suitable puller, remove coupling (21) from crankshaft portion of cylinder block and crankcase assembly (9). Remove key (24).

(3) Remove six capscrews (18) and lockwashers (17) securing crankcase cover (16) to crankcase assembly (9). Remove cover (16) and discard cover gasket (15).

(4) Straighten prongs of connecting rod capscrew tang washer (20), and remove capscrew (19) and tang washer (20). Remove the connecting rod bearing cap (14).

(5) Push piston and rod assembly (1) up through cylinder block assembly. Remove piston rings (2).

(6) Remove lockwire (4) from the inside of piston skirt. This frees the connecting rod wristpin (3) so it can be pressed out of piston. The connecting rod (7) is now free for removal.

d. *Crankshaft and Crankcase (fig. 6-85).*

(1) Remove three screws (6) securing front bearing retaining plate (5), and remove the plate.

(2) From power steering pump end of crankcase (2), press crankshaft (3) and front bearing (4) out of crankcase. Separate bearing (4) from crankshaft (3).

(3) Press rear bearing (1) out of crankcase (2).

e. *Cylinder Block and Valves (fig. 6-86).*

(1) Remove six capscrews (11) with lockwashers (12) securing the cylinder block assembly (23) to the crankcase (25). Remove the cylinder block assembly (23) from the crankcase. Discard gasket (14).

---

1 Piston and rod assembly
2 Piston ring set
3 Wristpin
4 Wristpin retaining lockwire
5 Piston
6 Connecting rod bushing
7 Connecting rod
8 Connecting rod bearing insert
9 Cylinder block and crankcase assembly
10 Coupling key
11 Compressor drive coupling
12 Washer
13 Nut
14 Connecting rod cap
15 Crankcase cover gasket
16 Crankcase cover
17 Lockwasher
18 Capscrew
19 Connecting rod capscrew
20 Connecting rod capscrew tang washer
21 Power steering pump drive coupling
22 Washer, tang
23 Nut
24 Coupling key

Figure 6-84—Continued.

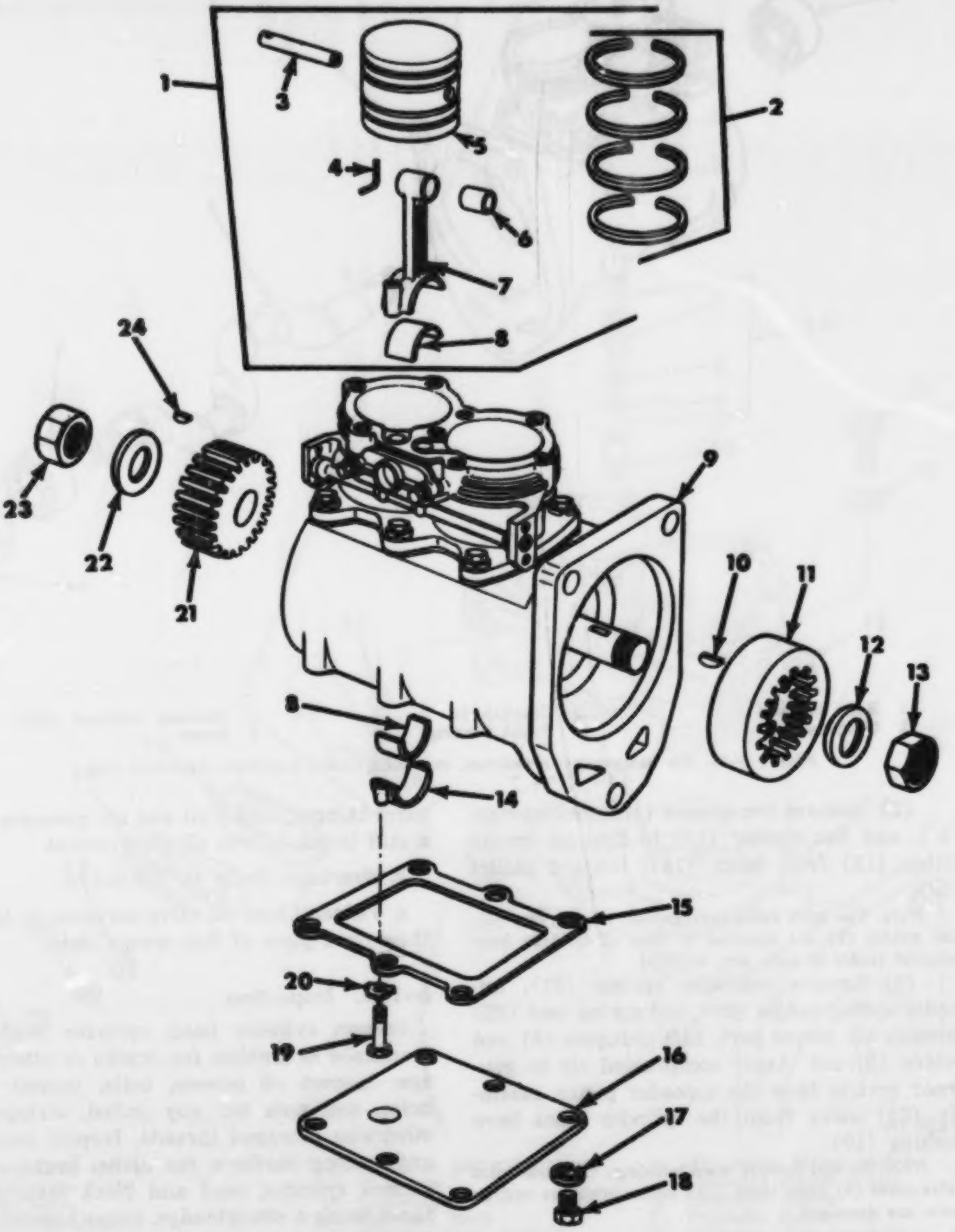

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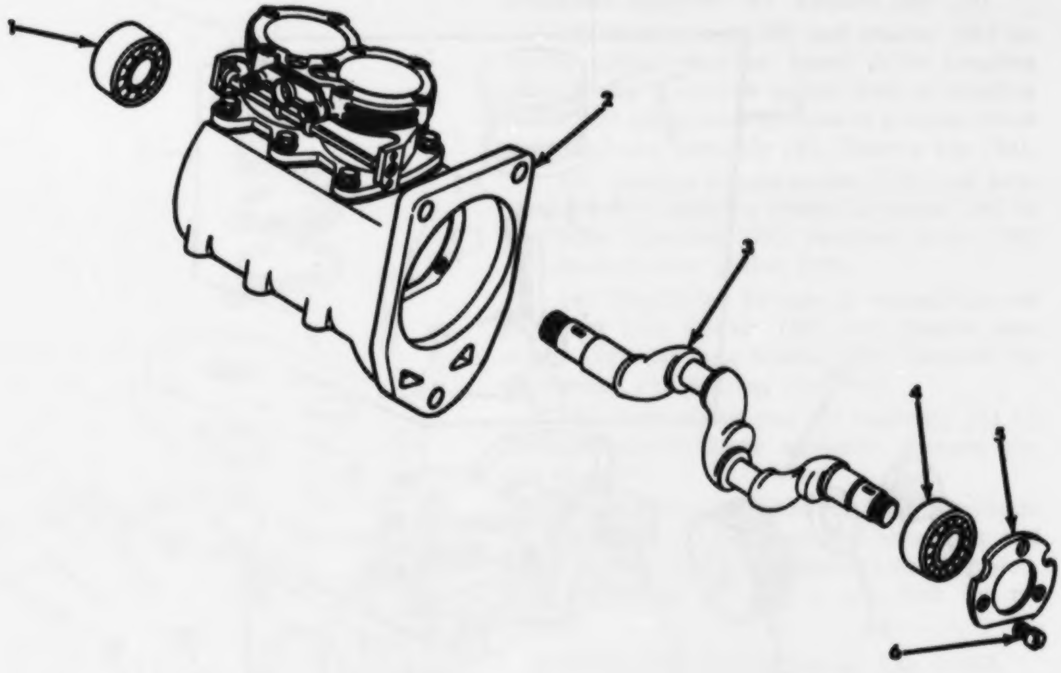
Figure 6–84. Air compressor crankcase, pistons, and connecting rods—exploded view.



1 Rear bearing
2 Crankcase
3 Crankshaft
4 Front bearing
5 Bearing retained plate
6 Screw

Figure 6-85. Air compressor crankcase, crankshaft, and bearings—exploded view.

(2) Remove two screws (15), lockwashers (16), and flat washer (17) to free air intake fitting (18) from block (13). Discard gasket (19).

Note. The inlet valve springs (1), inlet valves (3), and guides (2) are removed at time of cylinder head removal (refer to note, par. 6-107b).

(3) Remove unloader spring (21), unloader spring saddle (20), and spring seat (22) through air intake port. Lift plungers (6) and guides (5) out. Apply compressed air to governor port to blow the unloader piston assembly (24) away from the cylinder block bore bushing (10).

Note. Do not remove bore bushings (10) nor inlet valve seats (4) from block (13) unless bushings and/or seats are damaged.

6-108. Cleaning

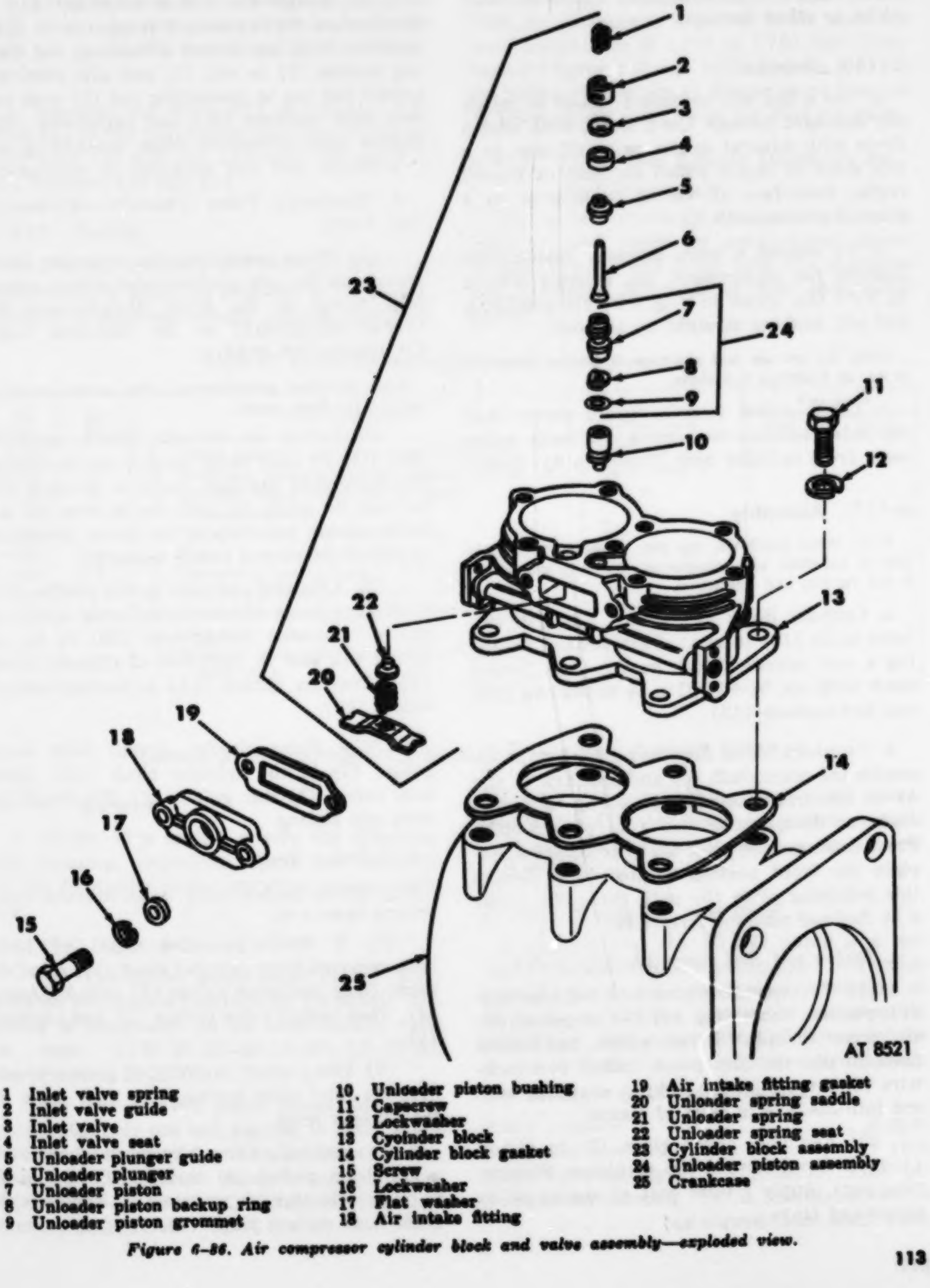
a. *General.* Clean all parts except bearings with a drycleaning solvent or mineral spirits paint thinner. Clean oil and air passages using a stiff brush to free all obstructions.

b. *Bearings.* Refer to TM 9-214.

c. *Valves.* Clean all valve surfaces by lapping them on a piece of fine crocus cloth.

6-109. Inspection

Inspect cylinder head, cylinder block, and crankcase assemblies for cracks or other damage. Inspect all screws, bolts, tapped screw holes, and nuts for any galled, stripped, or otherwise damaged threads. Inspect machined and mating surfaces for nicks, burrs, or deformed cylinder head and block mating surfaces, using a straightedge. Inspect piston rings for cracks, chips, or signs of excessive wear. Inspect bearings in accordance with TM 9-214. Inspect drive and driven couplings for excessive wear, burrs, or galled surfaces. Inspect the



1 Inlet valve spring
2 Inlet valve guide
3 Inlet valve
4 Inlet valve seat
5 Unloader plunger guide
6 Unloader plunger
7 Unloader piston
8 Unloader piston backup ring
9 Unloader piston grommet
10 Unloader piston bushing
11 Capscrew
12 Lockwasher
13 Cyoinder block
14 Cylinder block gasket
15 Screw
16 Lockwasher
17 Flat washer
18 Air intake fitting
19 Air intake fitting gasket
20 Unloader spring saddle
21 Unloader spring
22 Unloader spring seat
23 Cylinder block assembly
24 Unloader piston assembly
25 Crankcase

Figure 6–86. Air compressor cylinder block and valve assembly—exploded view.

valve seats for indications of excessive wear, nicks, or other damage.

6–110. Repairs

a. Use a tap, die, or thread chaser to repair any damaged threads. Use a crocus cloth wetted down with mineral spirits paint thinner, or a fine stone to repair galled surfaces or burred edges. Resurface all valves by lapping on a piece of crocus cloth.

b. To remove a worn unloader piston bore bushing for replacement, tap bushing with a ⅛ NPT tap, screw in a ⅛ NPT threaded rod, and pull bushing straight up and out.

Note. Do not use just any type of broken screw remover on bushings in b above.

c. Use a socket wrench square driver that fits valve opening to remove discharge valve seats from cylinder head (refer to fig. 6–83).

6–111. Assembly

Note. When available, use new gaskets and rebuild kits to assemble air compressor. Refer to paragraph 6–113 for fits and tolerances.

a. *Cylinder Block* (*fig. 6–86*). Assemble cylinder block (13) to head of crankcase (25) using a new cylinder block gasket (14). Secure block with six ⅜–16 NC x ⅞ capscrews (11) and lockwashers (12).

b. *Crankshaft and Bearings* (*fig. 6–85*). Assemble the crankshaft (3) and bearings (1 and 4) to the crankcase (2) according to marks made at disassembly (refer to par. 6–107). Press bearings into place using arbor press. Replace the front bearing retainer (5). Secure this retaining plate (5) with three No. 10–24 x ½ flathead machine screws (6).

c. *Piston and Rod Assembly* (*fig. 6–84*).

(1) To assemble piston and rod assembly (1), position connecting rod (7) in piston (5) and press wristpin (3) into piston, and lightly press fit pin (3) into place. Install new lockwire (4) through piston and pin, snapping wire end into the hole in skirt of piston.

(2) Assemble piston rings (2) to piston (5) with bevel toward top of piston. Stagger ring gaps. Apply a light coat of engine oil to piston and rings.

(3) Install the piston assembly (1) in block when the crankshaft journal is in down position from top. Install connecting rod bearing inserts (8) in rod (7) and cap (14). Assemble rod cap to connecting rod (7) with two new tang washers (20) and capscrews (19). Follow same procedure when assembling second piston and rod assembly to crankshaft.

d. *Discharge Valve Unloader—Mechanism* (*fig. 6–86*).

(1) When assembling the unloader mechanism, use the new prelubricated piston assemblies found in the Field Maintenance Kit (76040–745–229416) or the Unloader Valve Kit (76040–745–279614).

Note. Dimethyl polysiloxane is the recommended lubricant for these parts.

(2) Install an unloader piston assembly (24) into its bore being careful not to damage the preformed packing. Insert a plunger (6) through its guide (5) and slip it over the unloader piston top. Repeat the above procedure to install the second piston assembly.

(3) Assemble unloader spring saddle (20) to plunger guide (5) so forked ends center on guides. Assemble spring seat (22) to top of spring and seat in pilot hole of cylinder block (13). Position spring (21) to spring seat of saddle (20).

e. *Inlet Valve Guides.* Install inlet valve guides (2) to the cylinder block (13). Drop inlet valves (3) into guides (2). Fit should be loose and sliding.

f. *Cylinder Head.*

Note. All key numbers below, unless otherwise noted, refer to figure 6–83.

(1) If discharge valve seats (4) have been removed from cylinder head (6), reinstall them. Drop discharge valves (3) onto the seats (4). Then install valve spring (2) and capnuts (1).

(2) Use a small quantity of grease to adhere the inlet valve springs into their seats in the cylinder head.

(3) Carefully aline cylinder head (6) and a new head gasket (8) to block. Secure head to block with eight capscrews (5). Replace cylinder head coolant plugs (7).

g. Refer to figure 6–84. Using a new gasket (15) secure bottom cover (16) to crankcase with six ¼–20 NC capscrews (18) and lockwashers (17).

h. Assemble the drive (21) and driven (11) couplings to the crankshaft securing couplings with keys (10 and 24) and nuts (13 and 23) and washers (12 and 22).

6–112. Testing

To properly lubricate and test the rebuilt air compressor, it should be attached to the engine. Connect a reservoir whose volume, including the discharge tubing, is 1,300 cubic inches. With no air strainer attached to air inlet, operate compressor at 1,700 to 1,750 rpm. Pressure in reservoir should build up from 0 to 100 psi within 47 seconds. If this pressure does not build up, check inlet valve for sticking open.

6–113. Repair and Rebuild Standards for Air Compressor

The repair and rebuild standards included in table 12, with points of measurement shown in figures 6–18 and 6–20, give the minimum and maximum clearance of new and rebuilt parts.

Table 12. Repair and Rebuild Standards for Air Compressor

Fig No.	Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
				Field	Depot
6–18		a. Piston ring end gap when tried in cylinder	.007–.019 in.		
6–20	12	b. Clearance between ring and land of piston	.0015–.0030 in.		
6–20	8	c. Cylinder out-of-round at 90°-angle measurements.	.002 in.		
6–20	8	d. Cylinder taper (top and bottom)	.003 in.		
6–20	7–8	e. Piston to cylinder clearance	.002–.004 in.		
6–20	2–5	f. Connecting rod bushing to wristpin	.0015 in. (top)		
6–20	9	g. Crankshaft journal out-of-round	.001 in.		
6–20	9–10	h. Crankshaft journal to connecting rod bearing	.0003–.0021 in.		
		i. Discharge valve travel	.036–.058 in.		
		j. Depth of inlet valve seat below cylinder block deck.	.101–.145 in.		

Section XXII. REPAIR OF HYDRAULIC POWER STEERING PUMP

6–114. General

a. *Scope.* This section covers the disassembly, cleaning, inspection, repair, and assembly of the hydraulic power steering pump assembly.

b. *Two Different Models.*

(1) The earlier pump model design incorporates two needle bearings on the shaft. This pump is designated on its identification plate as type VTM–27–60–45–10–MO–L1–10–S8, part number 38QC417.

(2) The current pump model design incorporates only one ball bearing in place of the two needle bearings found in the earlier model, 1 above. The current pump is designated as type VTM–27–60–45–10–MO–L1–12–S8, part number 38QC417A.

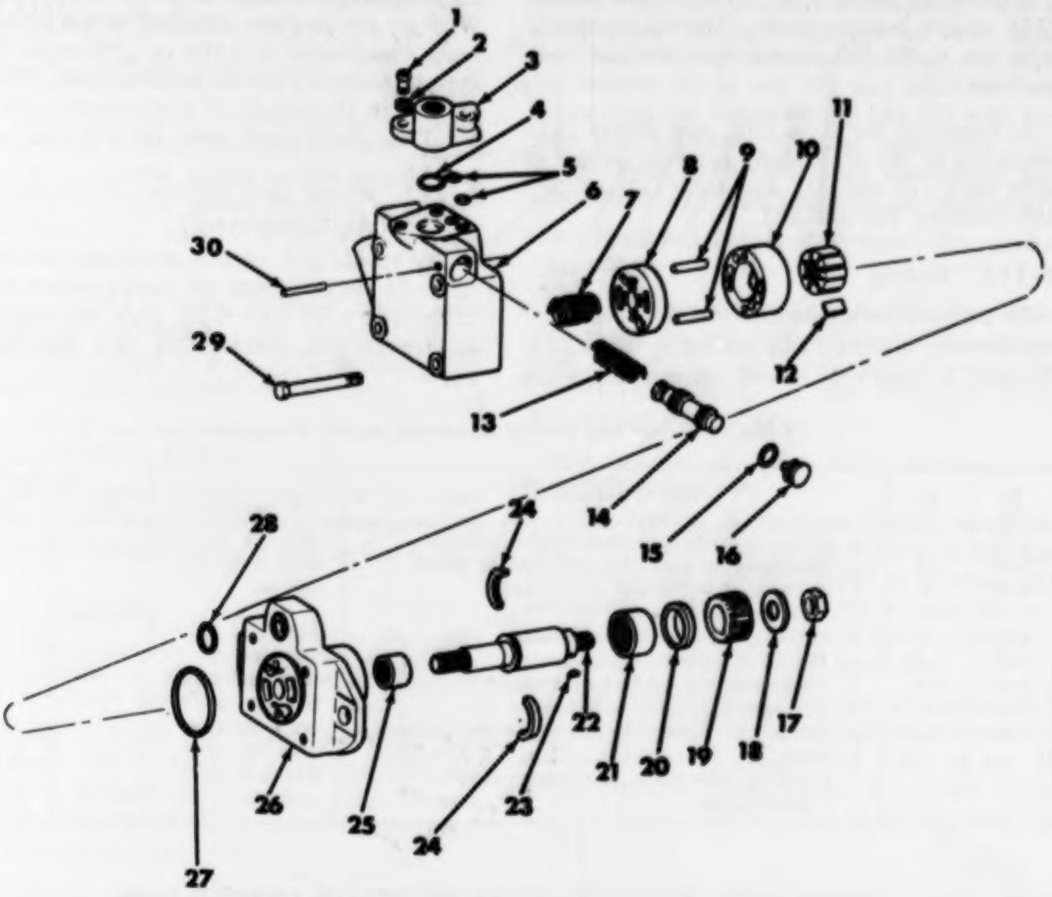
c. *Both Pump Assemblies.* Both pump assemblies discussed in b above are interchangeable as complete assemblies, and they will be repaired in a similar manner.

6–115. Description and Data

a. *Description.* The VTM27 pump is a balanced vane-type rotary pump used to furnish a constant rate of delivery per revolution of fluid which supplies power for the steering mechanism. It is coupled to and driven by the engine through the air compressor crankshaft.

b. *Data for Both Pump Designs.*

Pump capacity	6 gpm
Controlled flow rate	4.5 gpm
Relief valve setting	1,000 psi
Direction of rotation	counterclockwise (as viewed from shaft end)



1	Screw, internal wrenching, flange to housing
2	Washer
3	Manifold fitting
4	Preformed packing, large
5	Preformed packing, small
6	Cover, pump
7	Spring, plate tension
8	Plate, pressure
9	Pin, ring locating
10	Ring, rotor and vane
11	Rotor, vane
12	Vanes
13	Spring, relief control valve
14	Valve assembly, relief control
15	Preformed packing ("O" ring)
16	Plug, relief control valve
17	Nut, self-locking, drive gear to shaft
18	Washer, flat
19	Gear, drive shaft
20	Seal, shaft
21	Bearing, shaft, front
22	Shaft, pump
23	Key, drive gear to shaft
24	Washer, shaft thrust
25	Bearing, shaft, rear
26	Housing (body), pump
27	Preformed packing, body to cover, large
28	Preformed packing, body to cover, small
29	Capscrew, housing (body)
30	Pin, relief control valve retainer

Figure 6-87. Hydraulic power steering pump (VTM-27-40-45-10-MO-L1-10-S8 model)—exploded view.

6-116. Disassembly

Note. All key numbers in parentheses below, unless otherwise noted, refer to figure 6-87.

Caution: **Before removing unit or any parts of the unit, make sure the unit is free of any hydraulic pressure.**

a. ***Manifold.*** **Remove three screws (1) with washers (2) attaching manifold fitting (3).**

Remove fitting (3) along with large (4) and small (5) preformed packings from pump cover (6).

b. *Cover and Cartridge.*

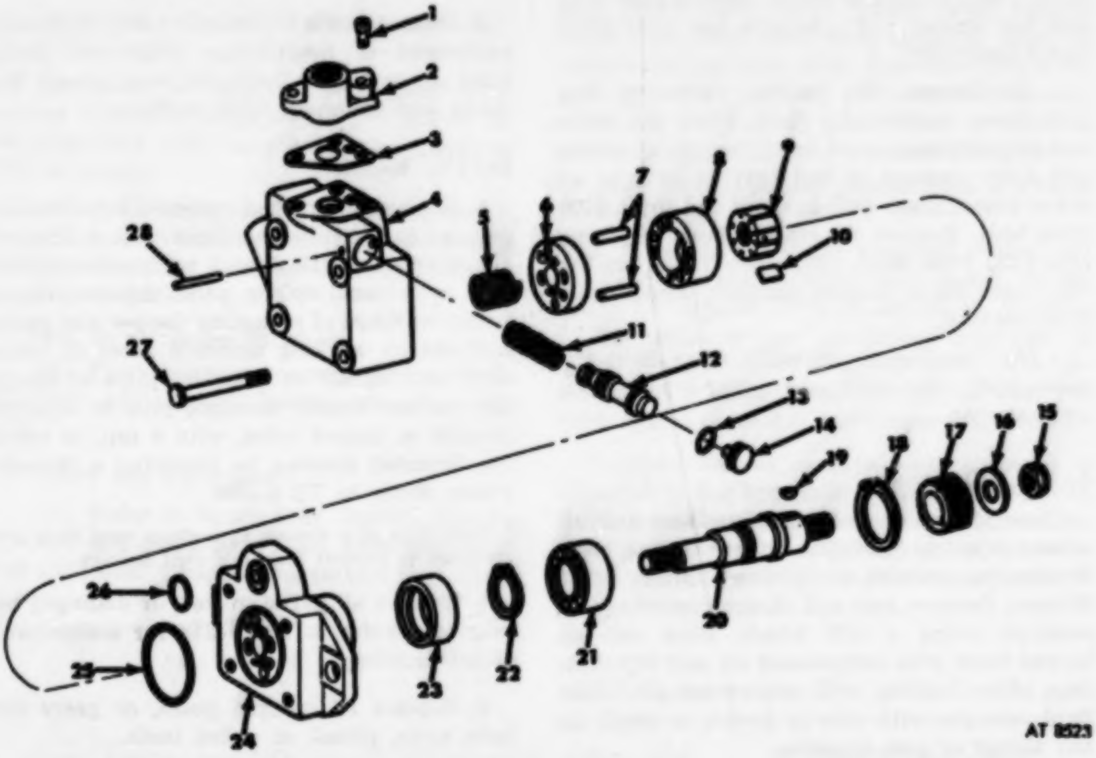
(1) Clamp pump mounting flange in a soft-jawed vise. Remove pump cover capscrews (29). Separate pump cover (6) from body (26). Remove tension spring (7), pressure plate (8), pump ring (10), locating pins (9), rotor (11), vanes (12), and the two preformed packings ("O" rings) (27 and 28).

(2) Clamp pump cover (6) in a soft-jawed vise, and drive the pin (30) which retains the relief valve, from cover. Work plug (16) free, and remove preformed packing ("O" ring) (15), relief control valve (14), and spring (13).

Caution: Do not allow relief control valve assembly to fall on a hard surface.

c. *Shaft and Body (VTM–27–60–45–10–MO–L1–10–S8 model).*

(1) Remove the nut (17) securing the drive gear (19). Using a suitable puller, remove gear (19) and flat washer (18). Remove key (23) from pump shaft (22).



1 Screw, internal wrenching, flange to housing
2 Manifold fitting
3 Manifold gasket
4 Pump cover
5 Spring, plate tension
6 Plate, pressure
7 Pin, ring locating
8 Ring, rotor and vane
9 Rotor, vane
10 Vanes
11 Spring, relief control valve
12 Valve assembly, relief control
13 Preformed packing ("O" ring)
14 Plug, relief control valve
15 Nut, self-locking, drive gear to shaft
16 Washer, flat
17 Gear, drive shaft
18 Snapring, bearing retainer
19 Key, drive gear to shaft
20 Shaft, pump
21 Bearing, pump shaft
22 Snapring, pump shaft retainer
23 Seal, shaft
24 Housing (body), pump
25 Preformed packing, body to cover, large
26 Preformed packing, body to cover, small
27 Capscrew, housing (body)
28 Pin, relief control valve retainer

Figure 6-38. Hydraulic power steering pump (VTM-27-60-45-10-MO-L1-12-S8 model)—exploded view.

(2) Place the drive end of pump body (26) on a suitable support which will allow passage of shaft seal (20) in an arbor press. From rear of body (26) press out seal (20), front needle bearing (21), thrust washers (24), and shaft (22).

(3) Tap rear needle bearing (25) away from body (26) with care, using a pin punch and hammer.

d. *Shaft and Body (VTM-27-60-45-10-MO-L1-12-S8 model).*

Note. All key numbers in parentheses below refer to figure 6-88.

(1) Remove nut (15) securing drive gear (17). Using a suitable puller, remove gear (17) and flat washer (16). Remove key (19) from pump shaft (20).

(2) Remove the bearing retaining ring (18) from pump body (24). Place the drive end of pump body on a suitable support which will allow passage of ball bearing (21) in an arbor press. Press both bearing and shaft (20) from body. Remove the smaller inner retaining ring (22) from shaft (20). Place inner bearing (21) race on a suitable support. Press shaft from bearing.

(3) Tap the oil seal (23) away from the pump body (24) with care, using a pin punch and hammer.

6-117. Cleaning

Clean the inner and outer surfaces and all areas subject to hydraulic fluid or grease, with drycleaning solvent or mineral spirits paint thinner. Remove gum and sludge deposits from castings, using a stiff brush. Blow out all tapped holes with compressed air and dry castings, after cleaning, with compressed air. Clean fluid passages with wire or probes to break up any sludge or gum deposits.

6-118. Inspection

a. Inspect all castings for cracks, using magnaflux equipment or magnifying glass and strong light.

b. Inspect machined surfaces for nicks, burrs, or raised metal. Mark damaged areas for repair.

c. Check all mating surfaces on housings and supports for warpage, with a straightedge or on a surface plate. Inspect mating surfaces for discoloration which may indicate persistent hydraulic fluid leakage.

d. Inspect all pipe plug and capscrew tapped holes for damaged or stripped threads.

e. Vanes must not have excessive play in slots or burrs on edges. Check each rotor slot for sticky vanes or wear. Vanes should drop in rotor slots by their own weight when both slot and vane are dry.

f. Inspect bearings in accordance with TM 9-214.

g. Inspect gears for cracks, using magnaflux equipment or magnifying glass and strong light. Inspect gear teeth for wear, sharp fins, burrs, and galled or pitted surfaces.

6-119. Repair

a. Replace all cracked castings. Repair minor damage to machined surfaces with a fine mill file or crocus cloth dipped in drycleaning solvent or mineral spirits paint thinner. Repair minor warpage of mounting flanges and gasket surfaces by working across a sheet of crocus cloth held tightly on a surface plate or similar flat surface. Repair damaged pipe or capscrew threads in tapped holes, with a tap, or repair the threaded opening by installing a threaded insert. Refer to TB 9-256.

Note. Pipe plug threads in castings must be in good condition to prevent hydraulic fluid leakage.

b. Replace all galled, pitted, or damaged ball bearings. Refer to TM 9-214 for maintenance of ball bearings.

c. Replace all cracked gears, or gears that have worn, pitted, or galled teeth.

6-120. Assembly

Note. To facilitate assembly, immerse all parts in clean OE-10 oil.

a. *Shaft and Body (VTM-27-60-45-10-MO-L1-10-S8 model).*

(1) Refer to figure 6-87. Press inner needle bearing (25) into pump body (26). Position split-ring thrust washer (24) onto shaft

(22) shoulder. Install this assembly into body (26).

(2) Using a suitable driver with arbor press, press outer needle bearing (21) onto shaft in the body (26).

Note. Bearing (21) must be pressed into a position .0156 inch below shaft seal (20) shoulder when assembled. This will provide the necessary required .010 to .015 inch shaft end play.

(3) Position the seal (20) into shaft end of body (26), being careful not to damage lip of seal. Use seal driver to press the seal (20) into body until seal bottoms in body.

Caution: Do not press seal in too far. This will damage seal.

b. *Shaft and body (VTM-27-60-45-10-MO-L1-12-S8 model).*

(1) Refer to figure 6-88. Press roller bearing (21) onto pump shaft (20). Install the retaining ring (22) on shaft to hold bearing (21) in place.

(2) Press shaft seal (23) into place in pump body (24) making sure seal rests on its shoulder. Carefully assemble shaft and bearing assembly to body.

Note. Do not damage lip of seal.

(3) Press bearing securely fitting it inside body (24). Install bearing retaining ring (18).

c. *Cover and Cartridge.*

(1) Refer to figure 6-87. Install locating pins (9) into pump body (26). Assemble pump ring (10) over pins, making certain that pump will operate in proper counterclockwise direction when viewed from shaft end (refer to par. 6-116b).

(2) Install rotor (11) with its chamfered edges of splines facing pump body (26). Assemble vanes (12) to rotor (11) with radii edges facing outward toward ring (10). Oil ring, rotor, and vanes with OE-10 oil.

(3) Assemble spring (7) and pressure plate (8) to body (26). Properly position large (27) and small (28) preformed packings. Position cover (6) over body (26), and secure cover to body with capscrews (29). Torque these screws (29)to 25-30 lb ft.

(4) Install relief control valve spring (13) into relief valve bore. Install relief control valve (14) into bore with hexagon head of valve entering bore first. Assemble plug (16) with preformed packing (15), and hold in position until a retaining pin (30) is installed to secure relief control valve assembly in place.

Note. All key numbers in parentheses in d below, unless otherwise noted, refer to figure 6-87.

d. *Manifold.* Assemble manifold fitting (3) to cover (6) with either a new gasket (3, fig. 6-88) in case of VTM-27-60-45-10-MO-L1-12-S8 model, or new preformed packings (4 and 5) in case of VTM-27-60-45-10-MO-L1-10-S8 model. Secure manifold (3) to cover (6) with three screws (1) and copper washers (2).

Caution: Do not operate pump unless it is attached to the hydraulic steering system with a full reservoir. This will avoid any damage occurring to vanes (12). Operate pump at a minimum of 600 engine rpm to prime the system.

CHAPTER 7

FUEL INJECTION SYSTEM

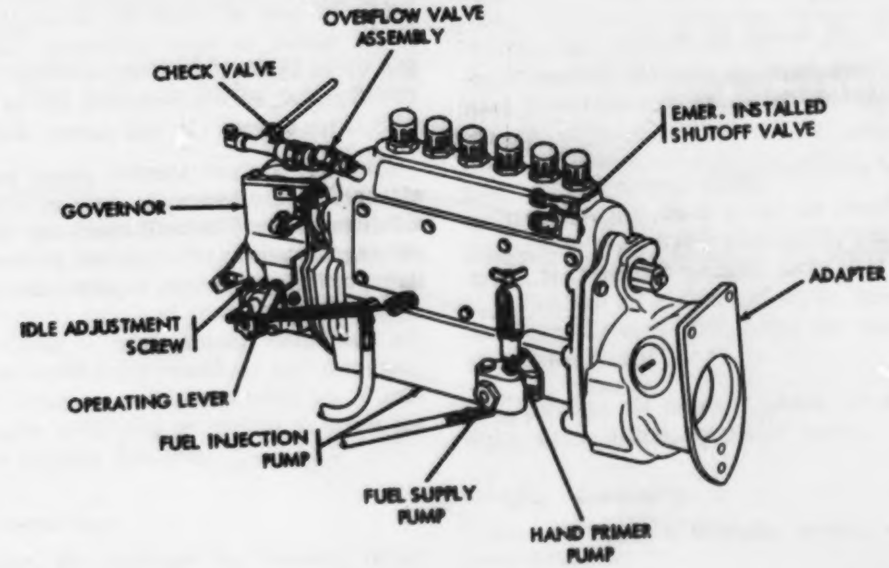
Section I. DESCRIPTION AND DATA

7-1. General

The fuel injection system of the Mack Model ENDT 673 engine (fig. 1-4) consists of the injection pump complete with governor, injector nozzles and holders, delivery and overflow fuel lines, and filters. The injection pump drives a fuel supply pump that draws fuel oil through the primary filter and pumps it through the secondary filter to the injection pump. The supply pump is equipped with a handpump for priming the fuel system. The injection pump meters and delivers at high pressure and correct timing all the fuel required for engine operation. The governor controls the fuel volume in direct ratio to the position of the accelerator pedal. It also prevents overspeeding of the engine when operation is on downhill condition.

7-2. Operating Principles

a. *General Operation.* In the Mack Model ENDT 673 engine, each cylinder has an individual injection pump which meters the fuel and delivers it under high pressure to the com-


OVERFLOW VALVE ASSEMBLY
CHECK VALVE
EMER. INSTALLED SHUTOFF VALVE
GOVERNOR
ADAPTER
IDLE ADJUSTMENT SCREW
OPERATING LEVER
FUEL INJECTION PUMP
FUEL SUPPLY PUMP
HAND PRIMER PUMP

AT 8524

Figure 7-1. Fuel injection pump assembly.

Figure 7–2. Fuel injector pumping principle.

bustion chamber. The individual pumps are mounted in a common housing, are operated by a common camshaft, and utilize the same control mechanism to insure an equal amount of fuel in each cylinder at the proper time. The flow of diesel fuel oil is shown in figure 1–5. Fuel oil is drawn through the primary filter by the supply pump. The supply pump forces the fuel through the secondary filter to the injection pumps. The supply pump must maintain a minimum pressure of 12-psi flow from the secondary filter. The fuel injection pumps force a measured amount of fuel through high-pressure lines to the spray nozzles in the combustion chambers. Excess fuel flows from the injection pumps through both an overflow valve rated at 15 psi and a check valve on the common housing and is returned to the fuel supply tank. Excess fuel in the injection nozzle also returns to the fuel tank.

b. *Fuel Injection Pump.*

(1) The pump is mounted on the engine in such a manner as to permit it to be driven by the engine timing gears. The cam lobes on the pump camshaft cause upward movement of the plungers, and springs produce the downward movement. The cams are arranged to actuate the individual injection pumps in the same sequence as the firing order of the engine (1–5–3–6–2–4). The injection pump camshaft is driven at one-half the engine speed on the Mack 4 cycle engine.

(2) The individual pumps are the lapped plunger, constant-stroke metering bypass type. The quantity of fuel delivered to the spray nozzle is regulated by the time that the plunger covers the bypass port. The plunger stroke length remains constant at all loads and speeds. The injection must be timed to occur 29 degrees BTC as demanded by the requirement of the engine. Volumetric control is effected by rotating the plunger. Two ports lead to the plunger barrel as shown in figure 7–2; one is the inlet and the other is the bypass port. The plunger has a groove around its circumference which has a circular lower edge and a helical upper edge. This space is connected to the plunger top by a vertical bypass slot allowing any fuel above the plunger to flow into the helical space. Two lugs at the lower end of the plunger engage a control sleeve around the plunger barrel. The upper portion of this sleeve is fastened to a gear segment which meshes with a horizontal tooth control rack. Any movement of

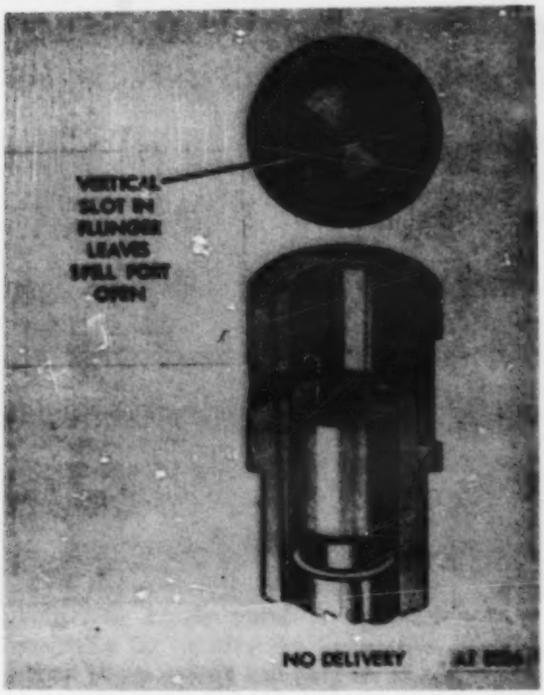


Figure 7–3. Fuel injector plunger no fuel delivery position.

the control rack rotates the outer sleeve and plunger, through its lugs, relative to the bypass port in the stationary pump barrel. Movement of the control rack rotates each injection pump an equal amount to provide an equal delivery of fuel to each cylinder.

(3) Fuel from the pump fuel sump, under pressure from the supply pump, rushes into the barrel as soon as the upper edge of the plunger uncovers the two opposite ports in the barrel. This action begins during the downward stroke of the plunger, and the ports remain open as the plunger starts moving upward. When the plunger covers the ports on its upward stroke, cutting off the fuel supply, the pressure exerted on the fuel causes the spring-loaded delivery valve to unseat, permitting the fuel to discharge into the high-pressure tubing which leads to the spray nozzle. The high-pressure delivery of fuel ceases as soon as the helix on the plunger uncovers the bypass port in the barrel. At this instant, the fuel under pressure above the plunger is returned to the sump by way of the vertical groove and the helix uncovering the bypass port, thereby relieving the pressure on the delivery valve. The delivery valve is quickly returned to its seat by the combined action of its spring and the great difference in pressure that exists between the barrel and the high-pressure line. In returning to its seat, the delivery valve performs a double function: it prevents excessive draining of the fuel from the high-pressure line, and it relieves the pressure in the high-pressure line. This pressure relief is accomplished by the retreat of an accurately lapped displacement piston in the delivery valve. Before the delivery valve actually resets, it reduces the pressure in the high pressure line by increasing the volumn, therein by a quantity equal to the volume of the displacement piston.

(4) The positions of the plunger from no fuel to maximum fuel delivery are shown in figures 7–3, 7–4, and 7–5. For maximum delivery, the plunger is rotated in the barrel so that it will nearly complete its full stroke before the helix indexes with the bypass port. For zero delivery, the plunger is rotated in its barrel until the vertical groove alines with the bypass port. In this position, the pressure chamber is connected, through the groove, with the sump during the full plunger stroke. Any fuel delivery volume between zero and maximum can be obtained by moving the control rack in or out. The movement of the control rack causes the plungers to rotate a proportionate amount. The rack controls the position of all six plungers simultaneously, thereby insuring the injection of equal amounts of fuel in each cylinder of the engine.

(5) The pump is supplied with engine lubricating oil from the engine lubrication system on an intermittent basis, to lubricate the cams, roller bearings, tappet assemblies, and governor. The intermittent feed of lubricating oil to the injection pump is controlled by the movement of the number 6 tappet assembly. Figure 7–6 illustrates the tappet assembly at its highest position, allowing a small quantity of oil to flow into the pump camshaft section with each rotation of the camshaft. Figure 7–6 also illustrates the tappet assembly at its lowest position, where the lubricating oil inlet is blocked and oil is prevented from entering the pump. A lubricating oil drain hole at the drive end of the pump permits excess oil to drain

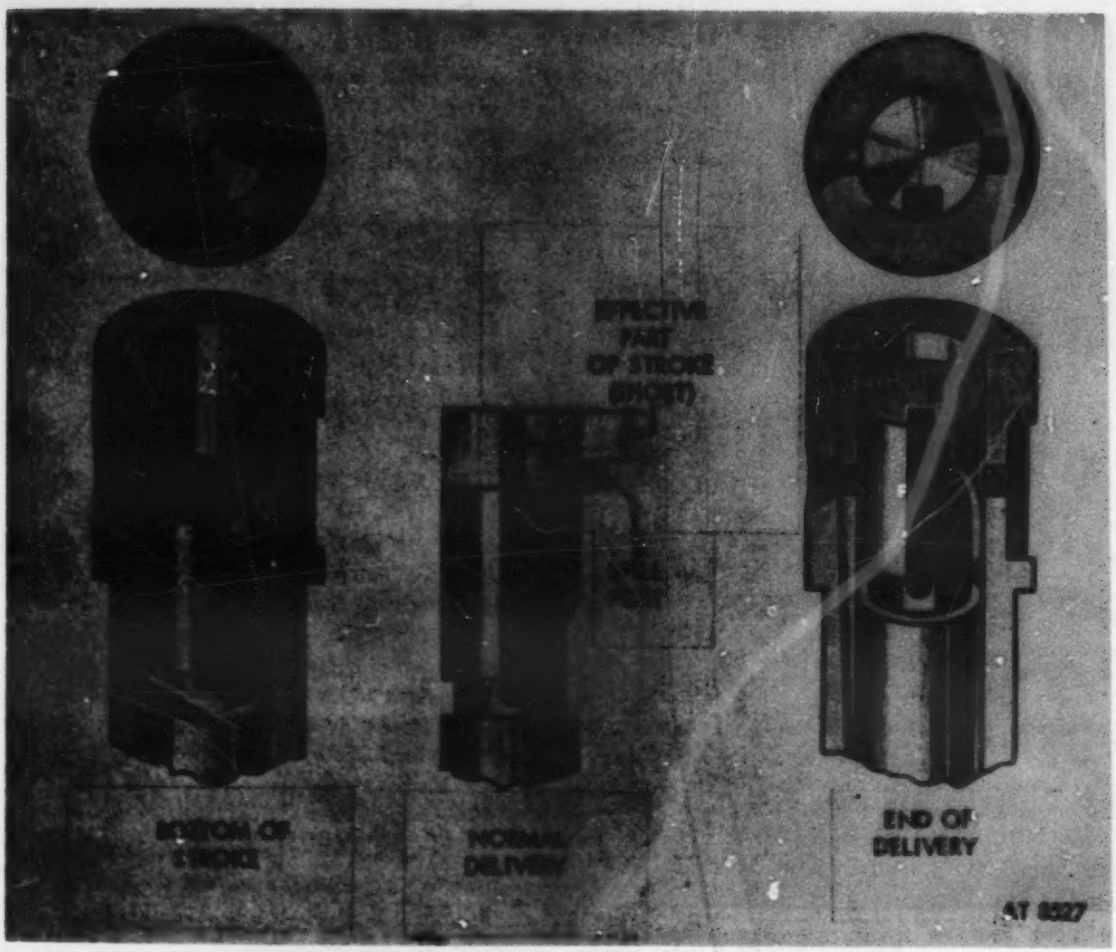


Figure 7-4. Fuel injector plunger—normal fuel delivery position.

back to the engine crankcase while retaining the required amount in the pump and governor. With this arrangement, it is necessary neither to add to nor change the lubricating oil in the injection pump, and no provision for checking the level is required.

c. *Injector Nozzle and Nozzle Holder.*

(1) *General.* For proper engine performance, the fuel oil must be injected into the combustion chamber in a definite spray pattern. This is accomplished by the injector spray nozzle which is held in the correct position in the cylinder head by the nozzle holder. The four-orifice nozzle and holder used in the Mack Model ENDT 673 engine is shown in figure 7-7.

(2) *Operation.* The fuel, delivered at the proper time by the injection pump, flows through the high-pressure line and enters the nozzle holder inlet. It then flows through a duct in the holder and nozzle body into the pressure chamber of the spray nozzle above the valve seat. At the moment the fuel pressure, developed by the injection pump, exceeds the pressure exerted by the pressure-adjusting spring, the nozzle valve is lifted off its seat and the fuel is forced through the orifices and sprayed into the combustion chamber of the

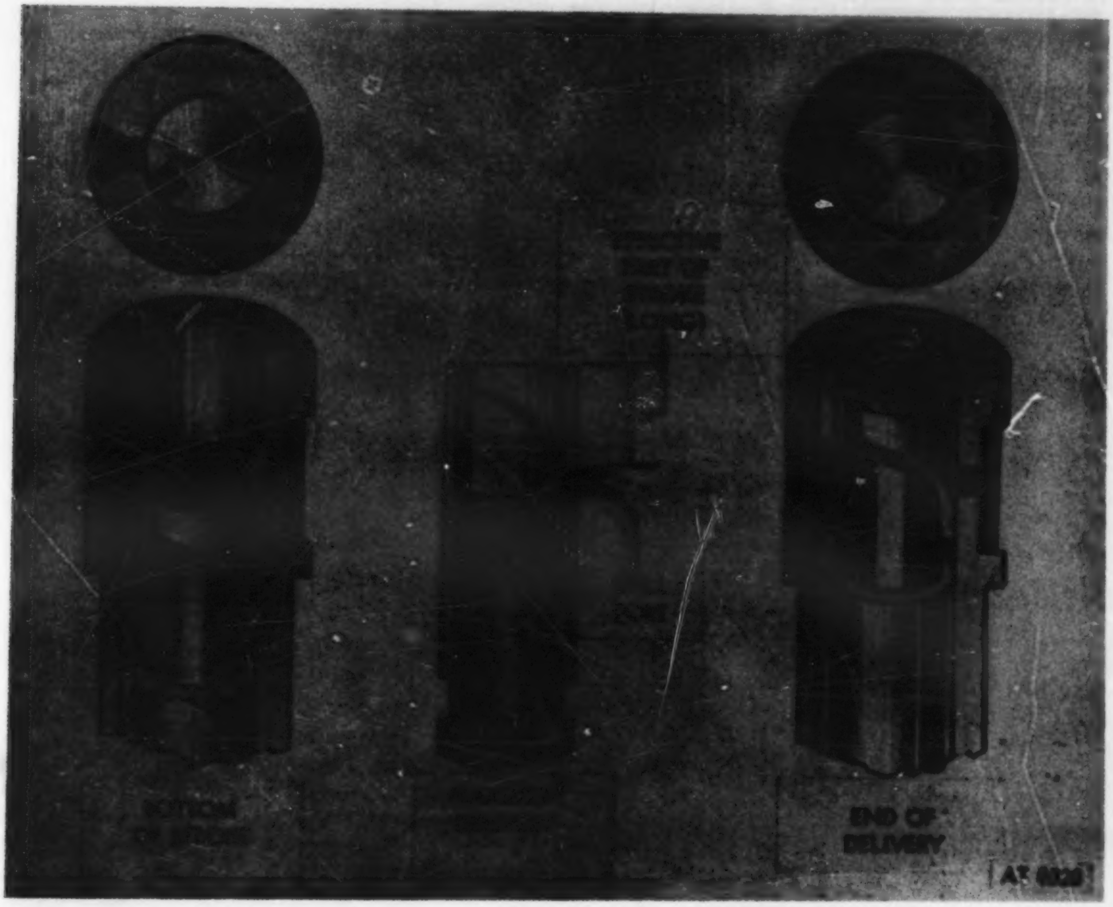


Figure 7–5. Fuel injector plunger—maximum fuel delivery position.

engine. As the helix of the injection pump plunger reaches the bypass port, the pump ceases to deliver fuel and the pressure spring returns the nozzle valve to its seat. A controlled amount of seepage of fuel between the close-tolerance, lapped surfaces of the nozzle valve and its body is necessary for lubrication. This leakage or overflow passes around the spindle and into the spring compartment. From here it is returned by overflow lines to the injection pump overflow valve.

d. *Fuel Supply and Hand-Primer Pumps.*

(1) *General.* The fuel transfer pump (fig. 7–8) is mounted directly on the housing of the injection pump and is driven by the injection pump camshaft. It is a variable-stroke, self-regulating, plunger-type pump that will build pressure only up to a predetermined point. It includes a hand-operated stroke pump for priming the low-pressure fuel system.

(2) *Operation* (*fig. 7–9*). As the injection pump cam allows the supply pump plunger to be forced by its spring toward the camshaft, the suction effect created opens the inlet valve and permits the fuel to enter the spring chamber. As the rotating cam lobe drives the plunger against its spring, the fuel inlet valve closes and the fuel is forced by the plunger through the outlet valve and around into the chamber created in back of the plunger by its forward movement. As the injection pump camshaft continues to rotate, it allows the compressed plunger spring to press the plunger

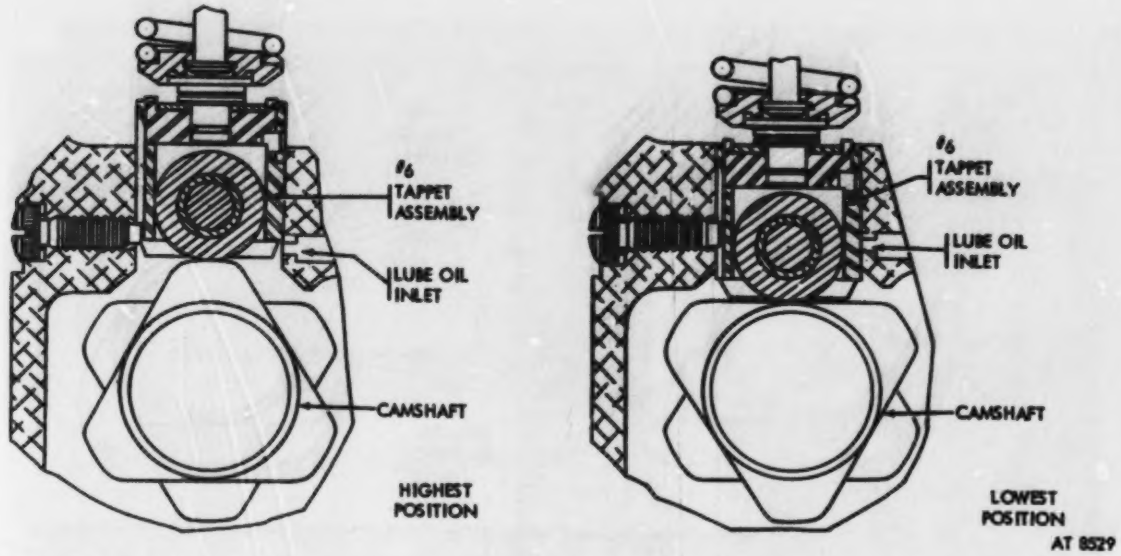


Figure 7–6. Fuel injector lubrication—tappet raised and oil inlet opened—tappet down and oil inlet cut off.

backward again, forcing the fuel oil behind the plunger out into the fuel line leading to the secondary filter and the injection pump. At the same time, the suction-effect cycle is repeated. This pumping action continues as long as the fuel is being used fast enough by the injection pump to keep the supply pressure from rising to the point where it equals the force exerted by the spring on the plunger. The pressure between the supply pump and the injection pump holds the plunger stationary against the spring and away from the pump rod. This prevents further pumping action until the pressure drops enough to permit the plunger to resume operation. This entire cycle is automatic and it continues as long as the engine is running.

(3) *Hand priming pump.* The hand priming pump, attached to the supply pump at the inlet valve chamber, permits priming of the fuel injector pump by manually filling the low-pressure side of the injection system. Raising the pump handle creates a vacuum which in turn lifts the inlet valve off its seat and causes fuel to be drawn into the hand primer pump barrel. On the down stroke the inlet valve close and fuel is pumped through the supply pump spring chamber to and through the outlet valve Continued stroking of the priming pump will draw in fuel and pump it out through the low pressure lines to the injection pump. The hand priming pump must be used to purge the fuel system of air at any time a line is disconnected or a filter changed. It may also be used to assist timing of the injection pump.

e. *Governor.*

(1) *General.* All diesel engines require governors to prevent overspeeding of the engine under light loads. Vehicle diesel engines also require control of idling speeds. Since diesel engine speed is controlled by the amount of fuel injected, the injection system is designed to supply the maximum amount of fuel which will enable the engine to operate at full load and to reach a predetermined maximum speed (rpm). However, if the maximum fuel charge were supplied to the cylinders with engine operating at "PARTIAL LOAD" or "NO LOAD," the engine speed would increase beyond the critical operating range and cause premature failure or excessive wear. Thus, the governor must accurately control the amount of fuel injected to control the engine speed. The governor used with the Mack Model ENDT 673 engine is of the mechanical or centrifugal

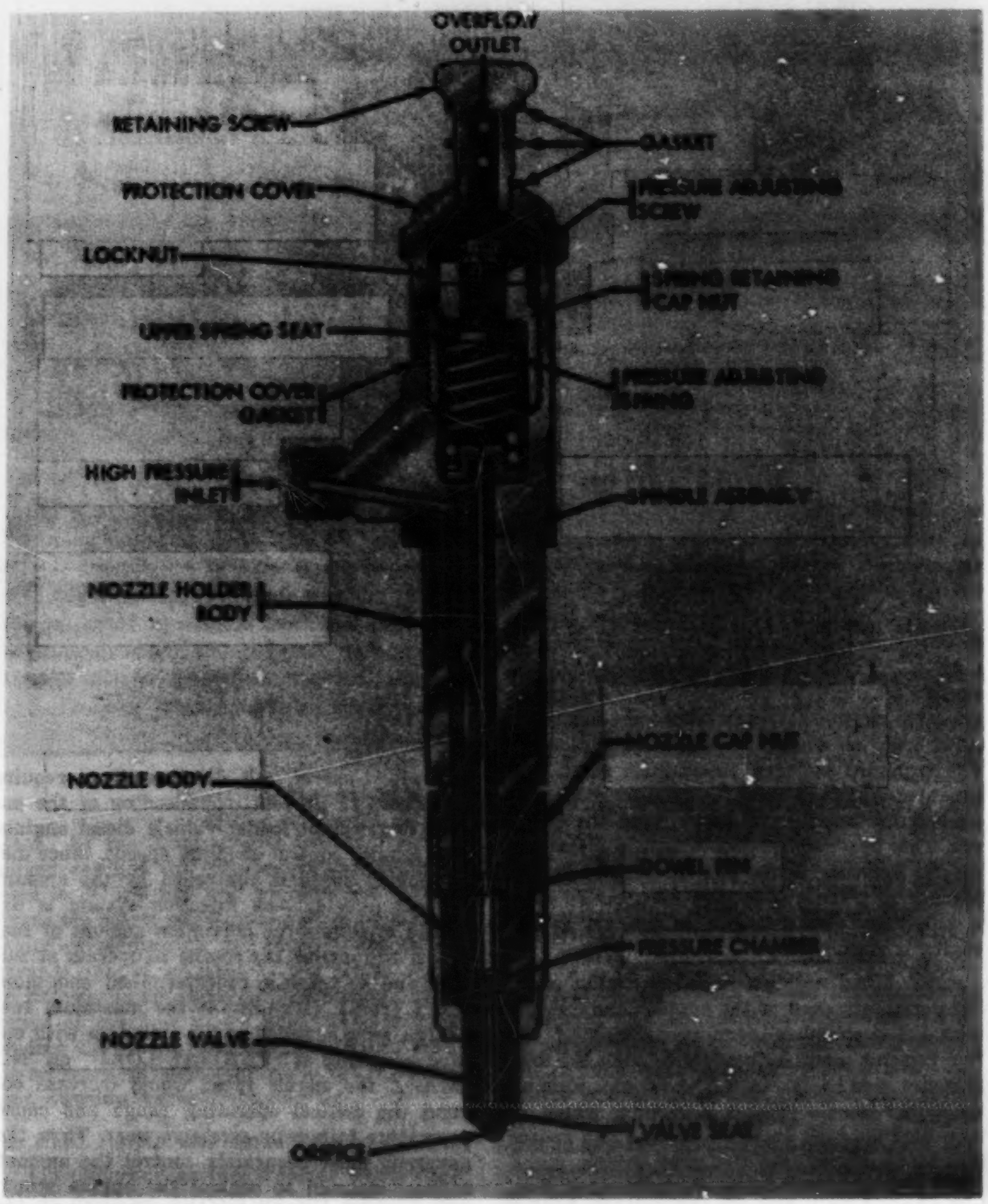

OVERFLOW OUTLET
RETAINING SCREW
GASKET
PROTECTION COVER
PRESSURE ADJUSTING SCREW
LOCKNUT
SPRING RETAINING CAP NUT
UPPER SPRING SEAT
PRESSURE ADJUSTING SPRING
PROTECTION COVER GASKET
HIGH PRESSURE INLET
SPINDLE ASSEMBLY
NOZZLE HOLDER BODY
NOZZLE CAP NUT
NOZZLE BODY
DOWEL PIN
PRESSURE CHAMBER
NOZZLE VALVE
VALVE SEAT
ORIFICE

Figure 7-7. Fuel injector nozzle and holder assembly.

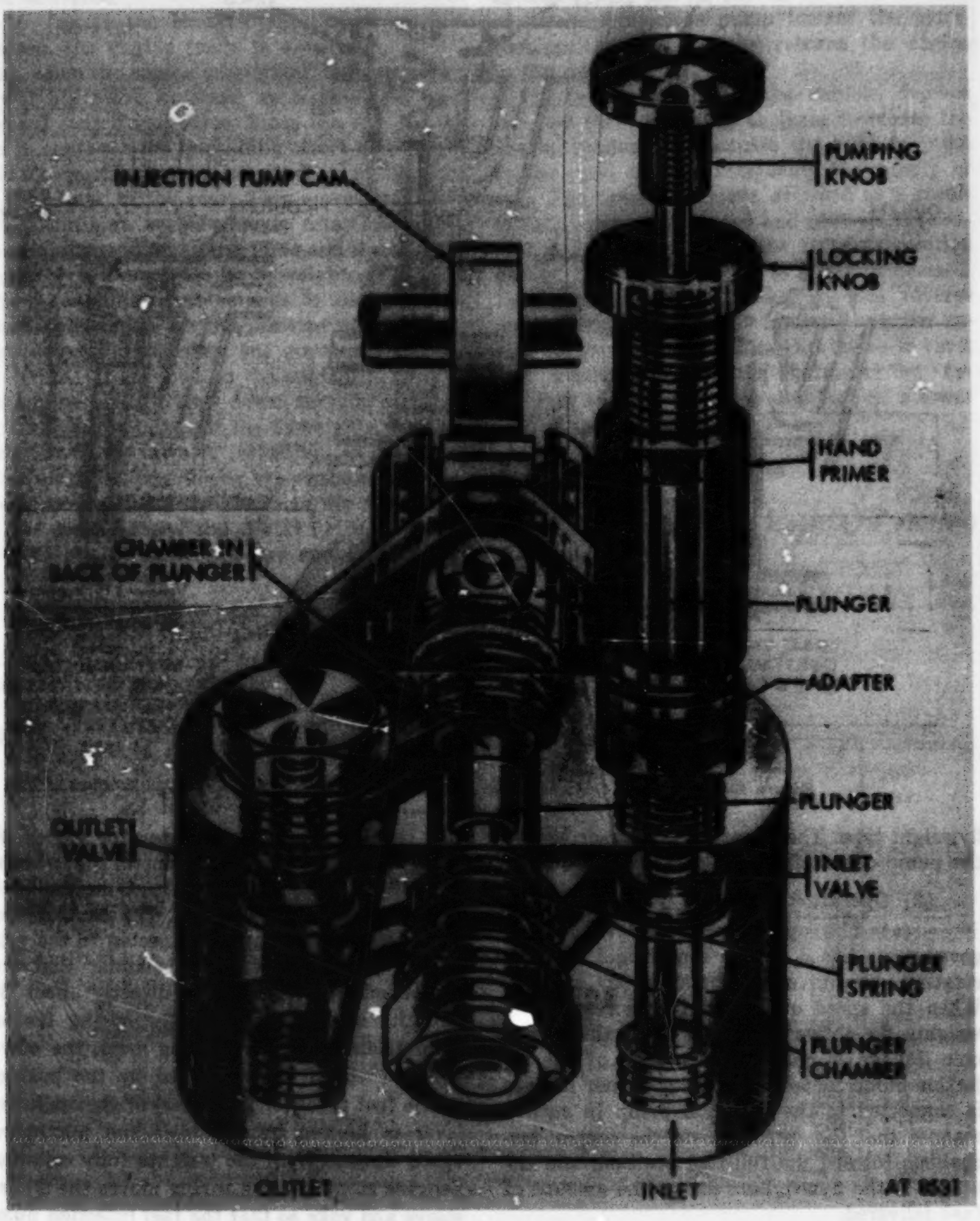

INJECTION PUMP CAM
PUMPING KNOB
LOCKING KNOB
HAND PRIMER
CHAMBER IN BACK OF PLUNGER
PLUNGER
ADAPTER
PLUNGER
OUTLET VALVE
INLET VALVE
PLUNGER SPRING
PLUNGER CHAMBER
OUTLET
INLET
AT 8531

Figure 7–8. Fuel transfer and hand-primer pump—cutaway view.

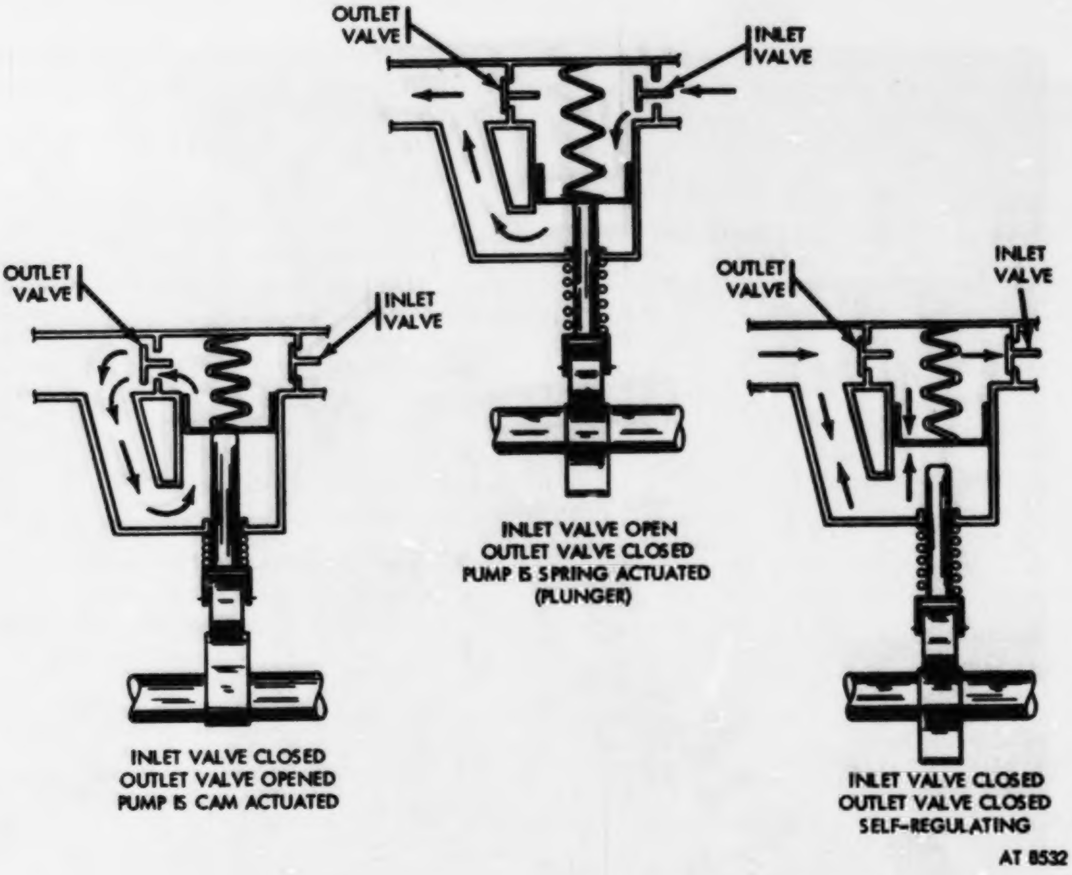

OUTLET VALVE
INLET VALVE
INLET VALVE OPEN
OUTLET VALVE CLOSED
PUMP IS SPRING ACTUATED
(PLUNGER)
OUTLET VALVE
INLET VALVE
INLET VALVE CLOSED
OUTLET VALVE OPENED
PUMP IS CAM ACTUATED
OUTLET VALVE
INLET VALVE
INLET VALVE CLOSED
OUTLET VALVE CLOSED
SELF-REGULATING
AT 8532

Figure 7–9. Schematic diagram illustrating operation of fuel supply pump.

flyweight type. The governor is gear-driven by the pump camshaft.

(2) *Operation.*

(a) The operation of the mechanical governor is based on the centrifugal force of rotating weights counterbalanced by springs. When the speed of the engine increases, the weights fly outward, pulling with them suitable linkage to change the setting of the injection pump control rod. The governor linkage is connected to the injection pump in such a manner that the spring moves the control mechanism toward the full-fuel position, and the action of the flyweights reduces the amount of fuel delivered.

(b) A typical variable speed governor is shown schematically in figure 7–10. With this type of governor, the operator varies the governor spring tension to control the quantity of fuel and does not at any time move the injector control rack directly. The control rack of the injection pump is connected to the yoke of the governor in such a manner that any movement of the yoke will directly affect the quantity of fuel injected. The spring tension is controlled by the operating lever, the movement of which is determined by the position of the foot throttle. The travel of the operating lever is limited by the idle- and maximum-speed screws. With the weights fully collapsed (engine stopped), the spring moves the sliding sleeve and yoke so that the fuel injection pump is in the full-fuel position. When the weights are fully extended, the sliding sleeve and yoke move to the rear and decrease the amount of fuel delivered.

(c) If the load on the engine is decreased, the engine tends to accelerate. However, when the engine accelerates, the governor flyweights move outward as a result of increased centrifugal force. Since the flyweights are in contact with the sliding sleeve assembly, this movement causes a longitudinal movement of the sleeve to the rear. This movement continues until an equilibrium is established between the governor spring force and the centrifugal force exerted by the flyweights. This occurs when the engine returns to the original speed determined by the position of the foot throttle and is effect on the governor spring.

(d) If the load on the engine increases, the engine tends to slow down, thereby causing an inward movement of the flyweights. As the weights move inward, resulting in reduced force on the sliding sleeve, the compressed governor spring shifts the sleeve to the front until the spring force and the centrifugal force exerted by the flyweights are again balanced. In this way, the yoke, following the movement of the sliding sleeve, moves the control rack of the fuel injection pump toward the more-fuel position and thereby returns the engine to the preset speed.

(e) To accelerate the vehicle, depress the foot throttle which, in turn, increases the spring tension. This causes the yoke to pivot to the rear, thereby increasing the supply of fuel. The flyweights move outward as a result of increased engine speed and prevent the control rack from reaching the full-fuel position unless the foot throttle is fully depressed. Deceleration is accomplished in the reverse manner. Spring pressure is decreased, the engine slows down, the flyweights move inward, and a balanced condition between the flyweights and the spring is obtained at a lower engine speed.

7-3. Description and Data

a. *Model Differences.*

(1) *Injection Pump, Model APE 6BB90Q 5036A.*

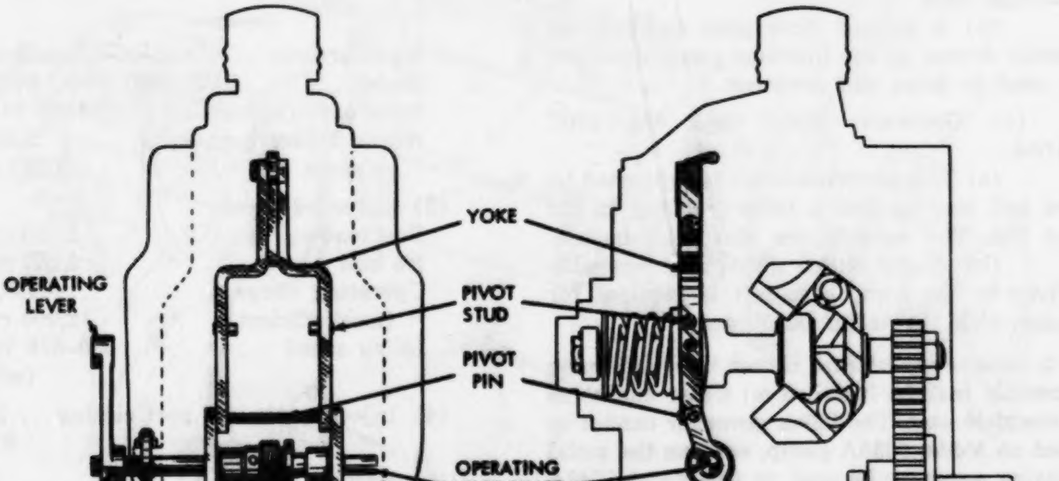


Figure 7-10. Mechanical governor—component locator.

(a) Model 5036A injection pump is the original equipment furnished on Mack Model ENDT 673 engine 11GBA 12006P1, FSN 2815-980-7092.

(b) Model 5036A injection pump includes Model GVB 250/1050C 5037B governor.

(2) *Injection Pump, Model APE 6BB90Q 5748A.*

(a) Model 5748A injection pump is the original equipment furnished on Mack Model ENDT 673 engine 11GBA 12006AP1, FSN 2815-087-2273 and 11 GBA 12006BPI, FSN 2815-045-6865.

(b) Model 5748A injection pump includes Model GVB 250/1050C 5479A governor.

(c) This pump is furnished with a spring-loaded operating lever. No additional accelerator retractor spring is required. With the spring lever, both the external fast and idle stopscrew stops are removed.

(3) *Governor, Model GVB 250/1050C 5037B.*

(a) This governor shift is supported on two ball bearings. The weights have two needle bearings each.

(b) A splined drive gear and hub assembly driven by the injection pump camshaft is used to drive the governor.

(4) *Governor, Model GVB 250/1050C 5479A.*

(a) This governor shaft is supported by one ball bearing and a teflon bushing in the end cap. The weights are also teflon-bushed.

(b) A slip clutch drive gear assembly driven by the pump camshaft is required for usage with the teflon bushings.

b. *Interchangeability.* Either injection pump assembly may be installed on either engine as a complete unit. The teflon governor cannot be used on Model 5036A pump, nor can the metal bearing governor be used on the Model 5748A injection pump, without changing the drive gear assembly and operating level. Hand-primer pumps and supply pumps are interchangeable.

c. *Data.*

(1) For 11GBA 12006P1 engine:

Injection Pump

Manufacturer	American Bosch
Model	APE 6BB90Q 5036A
Mack part number	313GC 4127
Plunger diameter	9 mm

Governor

Manufacturer	American Bosch
Model	GVB 250/1050C 5037B
Mack part number	709GB 318
Nozzle holder opening pressure	2,300–2,350 psi

(2) For 11GBA 12006 AP1 and 11GBA 12006 BP1 engine:

Injection Pump

Manufacturer	American Bosch
Model	APE 6BB90Q 5748A
Mack part number	313GC 4127A
Plunger diameter	9 mm

Governor

Manufacturer	American Bosch
Model	GVB 250/1050C 5479A
Mack part number	7096B 318A
Nozzle holder opening pressure	2,300–2,350 psi

(3) Governed speed

Fuel load	2,100 rpm
No load	2,250 rpm
Operating range (most efficient)	1,500–2,000 rpm
Idling speed	550–575 rpm (min)

(4) Injection timing, port closing ... 29° BTC

(5) Fuel oil grade ... 2D

Section II. CLEANING PROCEDURES

7-4. General

This section covers cleaning of the fuel injector assembly after it has been removed from the engine.

7-5. Cleaning Before Disassembly

Caution: **Absolute cleanliness of entire injection system working area and of injector pump parts must be maintained during all disassem-**

bly, inspection, repair, and assembly procedures. Dust, dirt, grime, or other abrasive matter must not come into contact with precision-lapped surfaces of internal parts.

a. Thoroughly clean all assemblies externally, before disassembly, to avoid introduction of grease, dirt, and foreign materials into the work area.

b. Cover or lug all threaded ports and openings to prevent entry of foreign matter during external cleaning operations.

c. Use mineral spirits paint thinner or dry-cleaning solvent and scrub the pump with a soft bristle brush to remove all external accumulation of grease, dirt, or other foreign matter.

d. Clean all parts immediately after disassembly. Protect clean parts against dirt and corrosion in instances when they will not be inspected immediately.

e. Clean all parts before inspection, after repair, and before assembly.

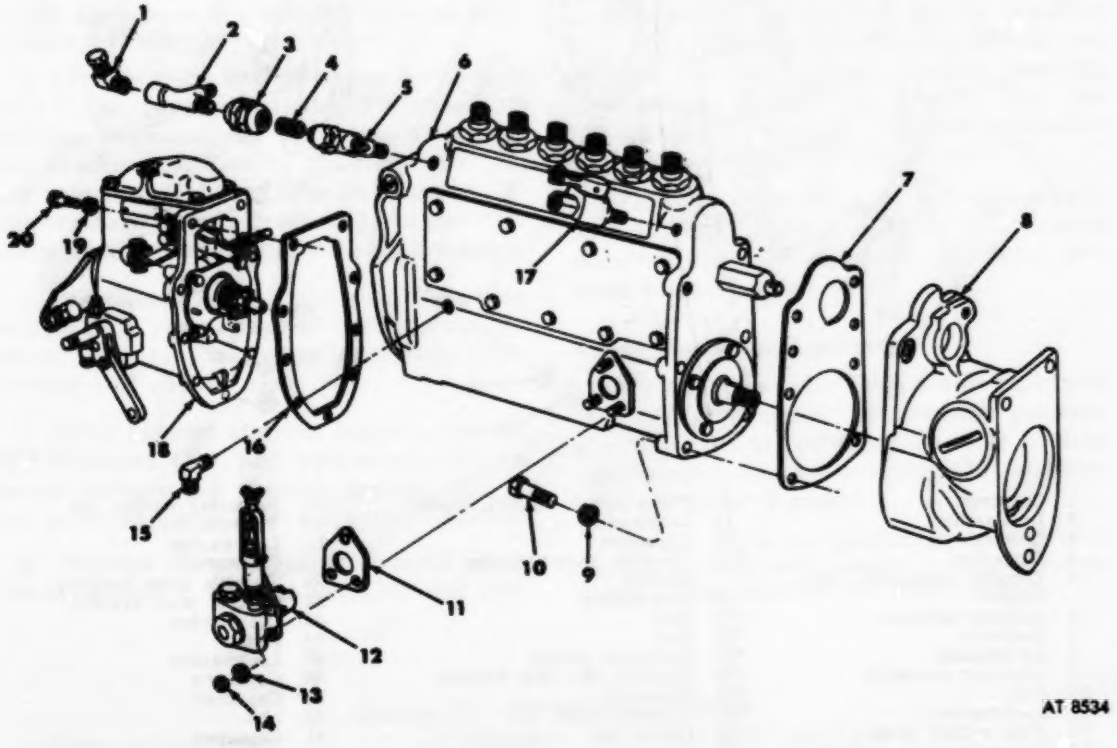
f. Keep hands free of any accumulation of grease which can collect dust and grit.

g. Avoid handling highly finished surfaces such as parts of the injector pump plungers that mate with the barrel, since skin oils and perspiration are highly corrosive to such parts.

h. Be certain that compressed air used to blow parts dry is free of moisture and dirt, and is of sufficiently low pressure to avoid damage to the parts.

i. Refer to TM 9–214 for instructions on care and maintenance of ball bearings.

Section III. REMOVAL OF SUBASSEMBLIES



1	Elbow, w/plug, testing
2	Tee
3	Check valve, fuel overflow
4	Connector
5	Overflow valve, fuel
6	Fuel injection pump assembly
7	Gasket
8	Adapter
9	Lockwasher
10	Capscrew
11	Basket
12	Fuel transfer and hand-primer pump assembly
13	Lockwasher
14	Nut
15	Elbow, lubricating oil inlet
16	Gasket
17	Valve, fuel emergency shutoff
18	Governor assembly
19	Lockwasher
20	Capscrews

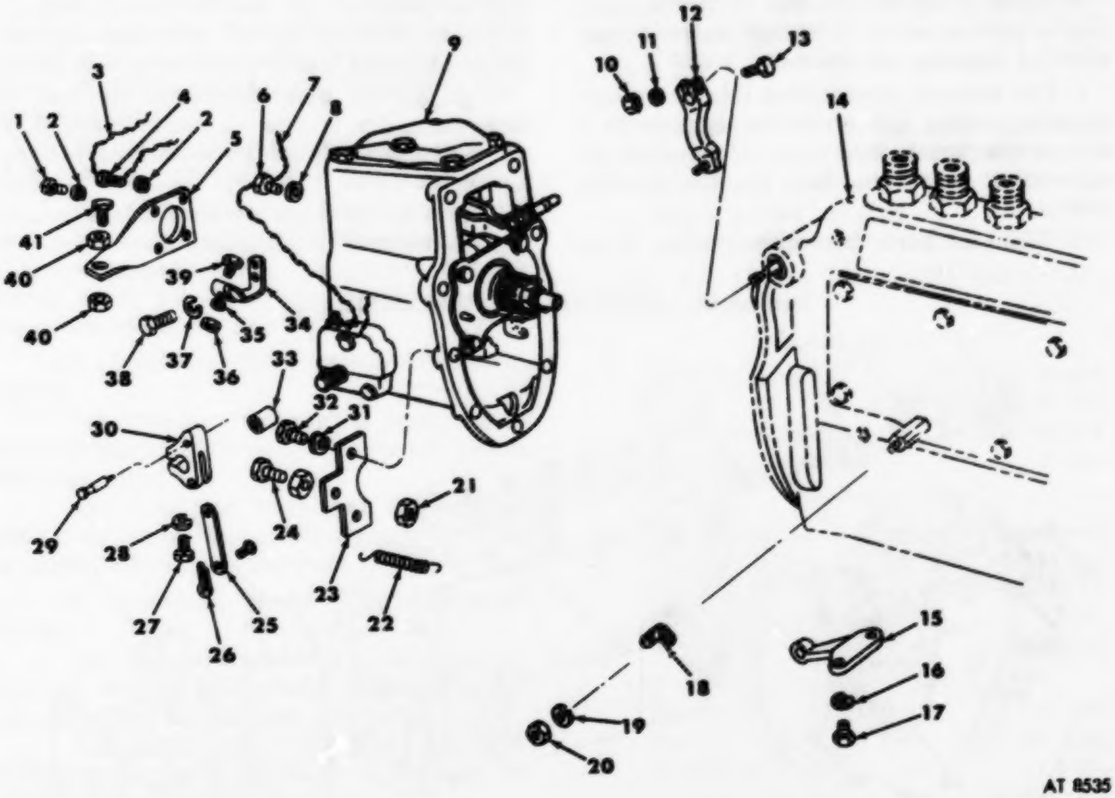
Figure 7–11. Fuel injector and related parts—partial exploded view.

7–6. General

This section covers the disassembly of the fuel injection system into major subassemblies in preparation for the repair of individual components. The complete sequence of disassembly is included; however, only those components requiring repair should be removed.

7–7. Injector Pump Adapter Assembly

Refer to figure 7–11. Remove six capscrews (10) and six lockwashers (9) securing adapter (8) to fuel injector pump housing (6). Remove adapter (8) and gasket (7). Discard gasket.



1	Capscrew
2	Lockwasher
3	Lockwire
4	Capscrew
*5	Throttle full-speed stop bracket
6	Locking capscrew
7	Lockwire
8	Lockwasher
9	Governor assembly
10	Nut
11	Lockwasher
12	Fuel shutoff lever
13	Capscrew
14	Fuel injection pump
15	Pump upper support bracket
16	Lockwasher
17	Capscrew
*18	Throttle return spring bracket
*19	Lockwasher
*20	Nut
*21	Nut
*22	Retractor spring
*23	Throttle idle stop bracket
*24	Capscrew
*25	Throttle link
*26	Cotter pin
27	Capscrew
28	Lockwasher
*29	Retractor spring pin
30	Throttle lever
*31	Lockwasher
*32	Capscrew
33	Throttle lever bushing
34	Control wire bracket
35	Lockwasher
36	Nut
37	Lockwasher
38	Capscrew
39	Capscrew
*40	Nut
*41	Capscrew

Figure 7–12. Fuel injector and related parts—partial exploded view.

Note.

*Required for type 5037B governor.

#Type 5749A throttle lever is spring-loaded.

7–8. Fuel Transfer and Hand-Primer Pump Assembly

Refer to figure 7–11. Remove three nuts (14) and three lockwashers (13) securing fuel transfer and hand-primer pump (12) to fuel injection pump housing (6). Remove fuel transfer and hand-primer pump assembly (12) and gasket (11) from fuel injection pump housing (6). Discard gasket (11).

7–9. Valves and Fittings

Refer to figure 7–11. Disassemble and remove elbow (1) and tee (2), check valve (3), and connector (4) from overflow valve (5). Remove overflow valve (5) and lubricating oil inlet elbow (15) from fuel injection pump (6). Remove fuel emergency shutoff valve (17).

7–10. Brackets and Operating Levers

Note. Key numbers in a through h below are shown on figure 7–12 unless otherwise indicated.

a. *Throttle Stop Bracket (type 5037B governor)*. Cut, remove, and discard lockwire (3) securing two capscrews (4) in top of throttle stop bracket (5). Remove two capscrews (4), two capscrews (1), and four lockwashers (2) securing throttle stop bracket (5) to governor assembly (9). Remove throttle stop bracket.

b. *Fuel Shutoff Lever*. Loosen nut (10), lockwasher (11), and capscrew (13) securing fuel shutoff lever (12) to fuel injector pump (14). Remove fuel shutoff lever.

c. *Pump Support Bracket (upper)*. Remove two capscrews (17), and lockwashers (16) securing pump upper support bracket (15) to fuel injection pump (14), and remove bracket.

d. *Throttle Return Spring Bracket (type 5037B governor)*. Remove nut (20) and lockwasher (19) securing throttle return spring bracket (18) to stud on fuel injection pump (14). Remove throttle return spring bracket (18) from fuel injection pump (14).

e. *Throttle Stop Bracket (type 5037B governor)*.

Note. The throttle stop bracket (23) is removed concurrently with the removal of the governor assembly (9) from the fuel injection pump (14). Remove nut (21) and capscrew (24) from throttle stop bracket (23).

f. *Throttle Lever, Link, and Retractor Spring (type 5037B governor)*. Remove retractor spring (22) from retractor spring pin (29). Remove retractor pin (29) from throttle lever (30). Remove capscrew (27) and lockwasher (28) securing throttle lever (30) to governor assembly (9). Remove throttle lever (30) from governor (9). Remove throttle lever bushing (33) from throttle lever (30).

g. *Control Wire Bracket*. Remove capscrew (38) and lockwasher (37) securing control wire bracket (34) to governor housing assembly (9). Remove control wire bracket (34). Remove capscrew (39), nut (36), and lockwasher (35) from control wire bracket (34).

h. *Locking Capscrew*. Cut and remove lockwire (7) from locking capscrew (6). Remove capscrew (6) and lockwasher (8) from governor housing assembly (9).

7–11. Governor Assembly

Refer to figure 7–11. Remove nine capscrews (20) and lockwashers (19) securing governor assembly (18) to fuel injection pump housing (6). Remove governor assembly (18) and gasket (16). Discard gasket.

Note. The throttle stop bracket (23, fig 7–12) is removed concurrently with removal of the governor assembly, on type GNB 250/1050C 5037B governor.

Section IV. REPAIR OF ADAPTER

7–12. General

This section covers the disassembly, cleaning, inspection, repair, and assembly of the fuel injection pump adapter.

7–13. Disassembly (fig 7–13)

Remove plug and preformed packing from adapter housing. Remove preformed packing from plug.

7-14. Cleaning

Clean adapter housing and plug, using dry-cleaning solvent or mineral spirits paint thinner. Use a stiff wire brush to remove any deposits of sludge or gum. Dry with low-pressure compressed air.

7-15. Inspection

Inspect adapter for cracks, using strong light and magnifying glass. Inspect mating surfaces for nicks and burrs. Inspect threads for damage.

7-16. Repair

Repair minor damage to mating surfaces with crocus cloth on a flat surface. Repair tapped hole with a thread tap. Replace adapter housing if cracked or warped beyond repair.

7-17. Assembly

Assemble inspection plug to adapter, using a new preformed packing (fig. 7-13).

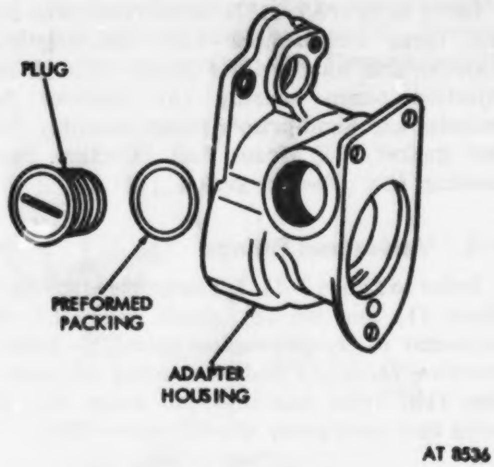


Figure 7-13. Adapter—exploded view.

Section V. REPAIR OF FUEL TRANSFER AND HAND-PRIMING PUMP

7-18. General

This section covers the disassembly, cleaning, inspection, repair, and assembly of the fuel transfer and hand-priming pump.

7-19. Disassembly

Note. Key numbers in a through h below are shown on figure 7-14 unless otherwise indicated.

a. Unscrew and remove hand primer pump (16) from handpump adapter (11). Remove pump.

b. Remove plunger gasket (15) from adapter (11). Discard gasket 15.

c. Unscrew and remove adapter (11) from fuel pump housing (6). Remove adapter gasket (12), valve spring (13), and valve (14) from housing (6). Discard gasket (12).

d. Unscrew and remove valve spring screw (10), retaining screw gasket (9), valve spring (8), and valve (7) from housing (6). Discard gasket (9).

e. Unscrew and remove plunger spring screw (23) from housing (6). Remove plunger screw gasket (24), plunger spring (25), plunger (26), and tappet shell spindle (27) from housing (6).

f. Remove tappet shell pin (5) securing tappet assembly (29) from housing (6). Remove tappet assembly (29) and tappet spring (4). Remove tappet roller pin (2) from tappet shell (3). Remove tappet shell roller (1) from tappet shell (3).

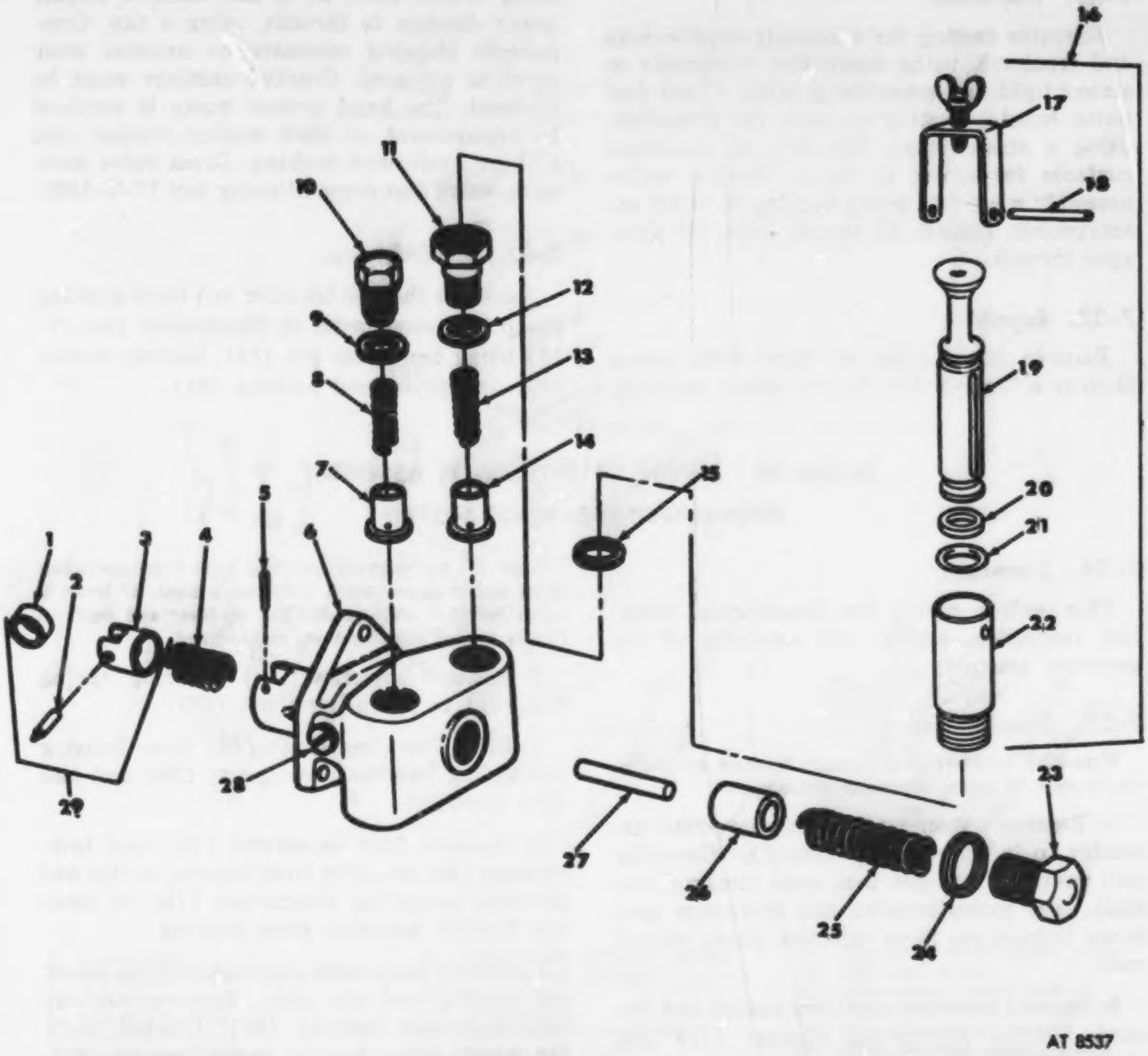
g. Unscrew and remove pipe plug (28) from housing (6).

h. Disassemble hand primer pump (16) in the following manner:

(1) Carefully support barrel (22) in an arbor press to remove or install cross pin (18) to avoid distortion.

(2) Withdraw plunger (19) from barrel (22).

(3) Remove preformed packing (21) and sealing washer (20) from plunger. Discard packing, washer and cross pin.



1	Tappet shell roller
2	Tappet roller pin
3	Tappet shell
4	Tappet spring
5	Tappet shell pin
6	Fuel pump housing
7	Valve
8	Valve spring
9	Retaining screw gasket
10	Valve spring screw
11	Handpump adapter
12	Adapter gasket
13	Valve spring
14	Valve
15	Plunger gasket
16	Hand primer pump
17	Bracket assembly
18	Cross pin
19	Plunger
20	Knob sealing washer
21	Plunger preformed packing
22	Barrel
23	Plunger spring screw
24	Plunger screw gasket
25	Plunger spring
26	Plunger
27	Tappet shell spindle
28	Pipe plug
29	Tappet assembly

Figure 7-14. Fuel transfer and hand-priming pump—exploded view.

7-20. Cleaning

Clean all components, using drycleaning solvent or mineral spirits paint thinner. Clean out all drilled passages, using a round rod or wire. Apply steam or compressed air to thoroughly clean. Use a stiff wire brush to remove any deposits of gum or sludge. Dry, using low-pressure compressed air.

7-21. Inspection

Examine casting for extremely small cracks and fractures, using magnaflux equipment or strong light and magnifying glass. Check fuel pump housing mating surfaces for distortion, using a straightedge. Examine all machined surfaces for scores or burrs. Replace entire assembly when fuel pump housing is found unserviceable. Inspect all tapped holes for damaged threads.

7-22. Repair

Remove minor nicks or burrs with crocus cloth or a fine mill file. Correct minor warpage, using crocus cloth on a flat surface. Repair minor damage to threads, using a tap. Components showing excessive or unusual wear must be replaced. Cracked castings must be replaced. The hand primer pump is serviced by replacement of knob sealing washer and plunger preformed packing. Dress valve seats using valve seat reconditioning tool 17-T-1933.

7-23. Assembly

Assemble the fuel transfer and hand-priming pump in reverse order of disassembly (par. 7-19) using new cross pin (18), sealing washer (20) and preformed packing (21).

Section VI. REPAIR OF GOVERNOR ASSEMBLY (MODEL GVB 250/1050C 5037B)

7-24. General

This section covers the disassembly, cleaning, inspection, repair, and assembly of the governor assembly.

7-25. Disassembly

Note. Key numbers in a through l below are shown on figure 7-15 unless otherwise indicated.

a. Remove capscrews securing governor assembly to injection pump assembly. Carefully pull governor straight back until locating pins (14) clear pump housing and disengage governor linkage pin from injection pump control rack.

b. Remove governor assembly gasket and discard. Remove lubricating plunger (17) and spring (16).

c. Cut and remove sealwire (3) securing capscrew (2). Remove capscrews (2, 4, and 5) and lockwashers (1). Remove inspection cover (43) and gasket (42). Discard gasket.

d. Remove capscrews (6) and washers (7 and 8) securing stop plate bridge (9). Remove bridge from governor housing (23).

e. Cut and remove sealwire (29) securing capscrew (30). Remove capscrews (30 and 27) and washers (26) securing operating shaft upper cover (31) and lower cover (25). Remove covers.

Note. Do not remove operating lever from operating shaft unless examination indicates a need. If lever is to be removed, scribe index line on lever and shaft to insure proper alinement on replacement.

f. Remove setscrew (22) securing spring hub (21) to operating shaft (28).

g. Slide operating shaft (28) from housing and spring hub. Remove spring (20) and hub (21) assembly.

h. Remove four capscrews (18) and lockwashers (19) securing front bearing bridge and governor operating mechanism (15) to housing. Remove assembly from housing.

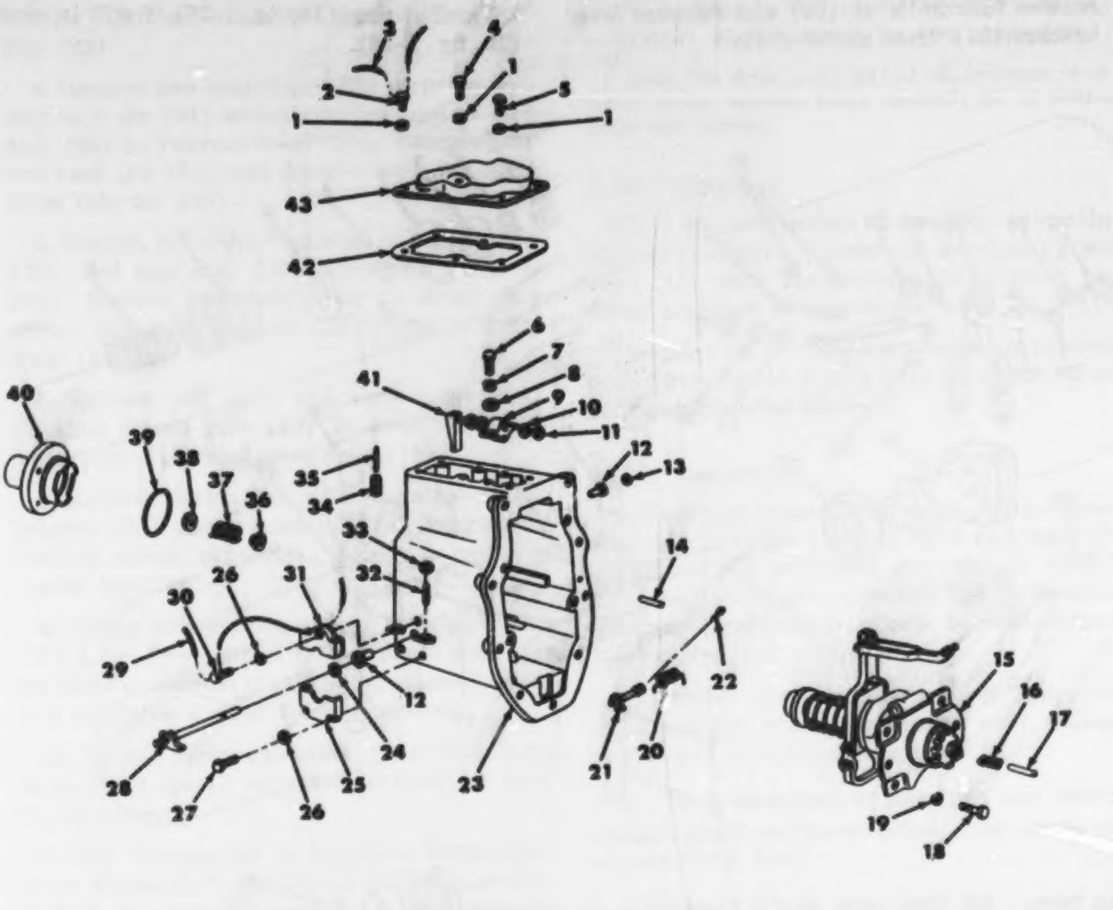
i. Remove capscrews and lockwashers securing bearing end cap (40). Remove end cap and preformed packing (39). Discard packing. Remove rear bearing backup spring (37), shims (38), and guide (36).

j. Unlock operating shaft stopscrews (32 and 35). Remove locknuts (33 and 34) and stopscrews.

k. Loosen stop plate locknuts (11), and remove nuts and lockwashers (10) securing stop plate (41) to bridge (9).

l. Inspect operating shaft bushings (12). Do not press out unless worn or scored, or otherwise damaged.

Note. Key numbers in m through w below are shown on figure 7-16 unless otherwise indicated.



1 Lockwasher
2 Inspection cover seal screw
3 Sealwire
4 Capscrew, long
5 Capscrew, short
6 Bridge capscrew
7 Lockwasher
8 Flat washer
9 Stop plate bridge
10 Lockwasher
11 Locknut
12 Operating shaft bushing
13 Plug
14 Governor housing locating pin
15 Bearing bridge and governor operating parts
16 Lubrication plunger spring
17 Lubrication plunger
18 Capscrew
19 Lockwasher
20 Operating shaft spring
21 Spring hub
22 Operating shaft setscrew
23 Governor housing
24 Operating shaft seal
25 Operating shaft lower cover
26 Lockwasher
27 Capscrew
28 Operating shaft
29 Sealwire
30 Operating shaft upper cover seal screw
31 Operating shaft upper cover
32 Full-load screw
33 Adjustment screw locknut
34 Idle adjustment locknut
35 Idle adjustment screw
36 Rear bearing spring guide
37 Rear bearing backup spring
38 Spring shim
39 Rear cover preformed packing
40 Rear cover
41 Stop plate
42 Inspection cover gasket
43 Inspection cover

Figure 7-15. Fuel injector governor—partial exploded view.

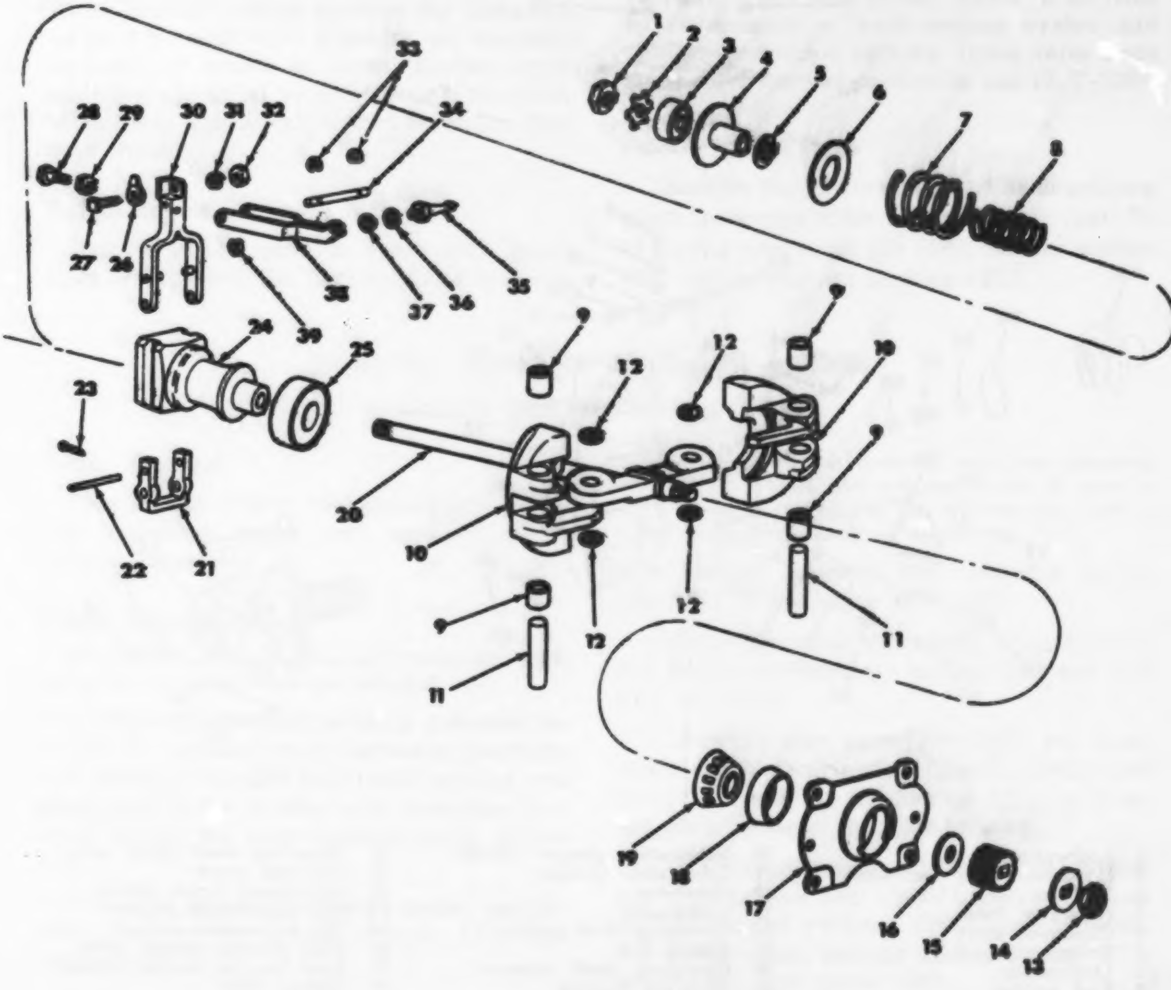
m. Remove nut (1) and lockwasher (2) securing rear bearing (3) to governor shaft (20)

Note. Observe which side of bearing faces outward.

n. Remove spring seat (4), spring spacers (5 and 6), and springs (7 and 8) from governor shaft (20).

o. Remove cotter pin (23) securing fulcrum pivot pin (22). Withdraw pivot pin (22) and remove fulcrum lever (30) and fulcrum lever bracket (21) from sleeve (24).

p. Remove lubrication plunger (17, fig. 7–15) and spring (16, fig. 7–15) if still in shaft (20, fig. 7–16).



1	Rear bearing nut
2	Lockwasher
3	Shaft rear bearing
4	Spring seat
5	Inner spring spacer
6	Outer spring spacer
7	Inner spring spacer
8	Inner spring
9	Weight bushing
10	Governor weight
11	Weight pin
12	Weight spacer
13	Driven gear nut
14	Lockwasher
15	Driven gear
16	Gear spacer
17	Front bearing plate
18	Front bearing cup
19	Front bearing cone
20	Governor shaft
21	Fulcrum bracket
22	Fulcrum pin
23	Cotter pin
24	Governor sleeve
25	Sleeve bearing
26	Cam stop
27	Cam screw
28	Droop screw
29	Droop screw locknut
30	Fulcrum lever
31	Cam lockwasher
32	Cam nut
33	Retaining rings
34	Fulcrum lever link pin
35	Fulcrum link stud
36	Lockwasher
37	Flat washer
38	Fulcrum link
39	Nut

Figure 7–16. Governor weight and shaft assembly—exploded view.

q. Remove nut (39), plain washer (37), lockwasher (36), and stud (35) from control rack link (38).

r. Remove two snaprings (33) securing control rack pin (34) which attaches control rack link (38) to fulcrum lever (30). Remove control rack pin (34) and control rack link (38) from fulcrum (30).

s. Remove nut (32), lockwasher (31), screw (27), and cam stop (26) from fulcrum lever (30). Remove lever adjusting or droop capscrew (28) and locknut (29) from fulcrum lever (30).

t. Remove nut (13) and lockwasher (14) securing driven gear (15) to shaft (20). Remove gear (15) and gear spacer (16).

u. Remove sleeve (24) with flyweight thrust bearing (25) as one assembly. Do not remove bearing unless inspection indicates a need for a new bearing.

v. Using arbor press, press flyweight pins (11) from flyweight (10) and shaft yoke. Do not press out needle bearings (9) unless inspection indicates a need for replacement.

w. Do not remove bearing (19) from governor shaft unless inspection indicates a need for replacement.

x. The disassembly of Injection Pump Governor Model GBV 250/1050C 5479A is accomplished in a similar manner to that covered in a through t above, except as noted:

(1) Rear bearing backup spring (37, fig. 7–15) spring sleeve (36, fig. 7–15), and shims (38, fig. 7–15) are not used.

(2) Operating shaft bushings (12, fig. 7–15) are teflon.

(3) Governor rear shaft (20, fig. 7–16) does not require rear bearing (3, fig. 7–16), nut (1, fig. 7–16), or lockwasher (2, fig. 7–16). The shaft is supported by a teflon bushing molded into the rear cap (40, fig. 7–15). Do not remove teflon bushing. Instead, replace complete cap.

Note. Rear cap external boss on governor bearing is 1⅛ inches, and teflon-bushed governor ⅝-inch diameter.

(4) Governor shaft front bearing (19, fig. 7–16) is a roller bearing pressed onto the shaft. The shaft and bearing assembly is retained in the bearing bridge plate (17, fig. 7–16) by a retainer plate secured by two capscrews.

Note. The drive gear, part of the governor, is attached to the injection pump camshaft and is covered under that section.

7–26. Cleaning

Clean all components thoroughly with mineral spirits paint thinner or drycleaning solvent. Dry with low-pressure compressed air. Clean bearings in accordance with TM 9–214.

Caution: Do not use compressed air to clean or dry bearings as it may have an erosive effect on highly polished surfaces.

7–27. Inspection

a. Carefully inspect for cracks, using magnaflux equipment or a strong light and magnifying glass. Pay particular attention to weights and weight-to-shaft connector. Cracks in either of these components indicate immediate need for replacement.

b. Inspect areas adjacent to weight shaft shoulders for evidence of uneven wear, indicating a bent or twisted weight shaft.

c. Check diameters of bearings and mating weight shaft surfaces. Total wear must not exceed 0.006 inch.

d. Inspect driven gear teeth for cracks and wear. Inspect for sharp burs and galled or pitted surfaces.

7–28. Repair

a. Replace all components found to be unserviceable during inspection.

b. Remove minor burs and sharp fins from driven gear with crocus cloth.

7–29. Assembly

Note. Key numbers in a through r below are shown on figure 7–16 unless otherwise indicated.

a. Fit weights (10) to governor shaft (20) using proper spacer washer (12) to obtain .001-.004-inch total clearance between yoke and weights. Press pins (11) through weights and yoke.

Note. Use care to aline oil hole in yoke with oil hole or grove in pin, or premature bearing failure will result.

b. Press bearing cone (19) on shaft (20), if removed. Install bearing cup (18) in bearing bridge (17) and assemble to shaft; replace driven gear (15) and spacer (16). Secure with lockwasher (14) and nut (13). Lock tab of washer to secure nut.

c. If removed, press sleeve bearing (25) on sleeve (24), facing the same direction it had faced originally. Slide sleeve (24) and bearing (25) on governor shaft (20), bearing end first, engaging flyweights (10).

d. Temporarily install inner spring (8), outer spring (7), spring seat (4) and rear end bearing (3) on governor shaft (20). Secure finger-tight with nut (1).

Note. Install rear shaft ball bearing (3) with convex side facing spring seat.

e. Check fulcrum lever (30) to insure that the two fulcrum pivot pins are in place. Assemble cam stop (26) and fulcrum link (38) to fulcrum lever (30). Slide lever into grooves in sleeve assembly (24).

f. Assemble spring (20, fig. 7–15) and hub (21, fig. 7–15) to fulcrum lever bracket (21, fig. 7–16). Both spring tangs must be in full contact with the bracket sides. If spring is bent, replace. If spring has worn groove in bracket, turn bracket end for end and use new spring.

g. With fulcrum lever (30) in place, aline bracket holes with lever holes and secure with fulcrum lever pin (22). Insert cotter pin (23).

h. If necessary, press new operating shaft bushings (12, fig. 7–15) into housing (23, fig. 7–15) and ream to size using reamer FSN 5110–977–7410. Soak shaft oil seal (24, fig. 7–15) in lubricating oil and press into place. Press plug (13, fig. 7–15) into housing on far end of operating shaft (28, fig. 7–15).

i. Assemble governor mechanism (15, fig. 7–15) into housing. Locate front bearing bridge (17) on locating dowels with cut-out area at bottom. Secure with capscrew (18, fig. 7–15) and washers (19, fig. 7–15). Use lockwire, and wire together pairs of screws vertically at each side of bridge.

j. Slide operating shaft (28, fig. 7–15) into housing (23, fig. 7–15), through fulcrum bracket (21) and spring hub (21, fig. 7–15). Secure with setscrew (22, fig. 7–15).

k. Assemble governor to injection pump, using new gasket. Engage fulcrum lever link stud (35) in control rack hole. Secure with capscrews and lockwashers.

l. Remove nut (1) securing rear bearing (3). Remove bearing (3), spring seat (4), inner spring (8), and outer spring (7) in order to obtain proper spring spacings. Both idle and full-load adjustment screws (32 and 35, fig. 7–15) must be removed to obtain proper readings.

m. Insert inner spring (8) into governor housing. Place spring seat (4) in position. Using a scrap rear cap (40, fig. 7–15) cut in half horizontally, over spring compartment and feeler gage, measure distance between spring seat (4) and rear cover for the spring gap. Inner spring gap should be .079- .098 inch. Use inner spring spacers (5) in various thicknesses to obtain proper gap. Recheck for correct gap. Remove spring seat (4), spacers (5 and 6), and inner spring (8).

n. Place outer spring in spring compartment and install spring seat (4). Check for flush gap in manner similar to that described in m above. Use various thicknesses of outer spring spacers (6) to obtain 0.0-inch gap. Outer spring (7) must be precompressed to .020 inch by addition of .020-inch spacer (6) to those required in obtaining flush gap. Remove spring seat (4), spacers (5 and 6), and outer spring (7).

o. With proper spring gaps determined, replace inner and outer springs (8 and 7) with their respective spacers (5 and 6) and spring seat (4). Replace ball bearing (3), lockwasher (2), and nut (1). Lock nut in place. Replace operating shaft adjustment screws (32 and 35, fig. 7–15) and locknuts (33 and 34, fig. 7–15).

p. Replace bearing backup spring (37, fig. 7–15) in rear cap (40, fig. 7–15) with spring sleeve. Assemble rear cap (40, fig. 7–15) to governor. Check governor shaft for .001- to .004-inch end play. Use backup spring shims (38, fig. 7–15) to obtain proper end play.

q. Assemble stop bridge (9, fig. 7–15) to governor housing (28, fig. 7–15). Assemble inspection cover (43, fig. 7–15) with new gasket (42, fig. 7–15). Do not tighten; cover will be removed on test stand to time and set governor.

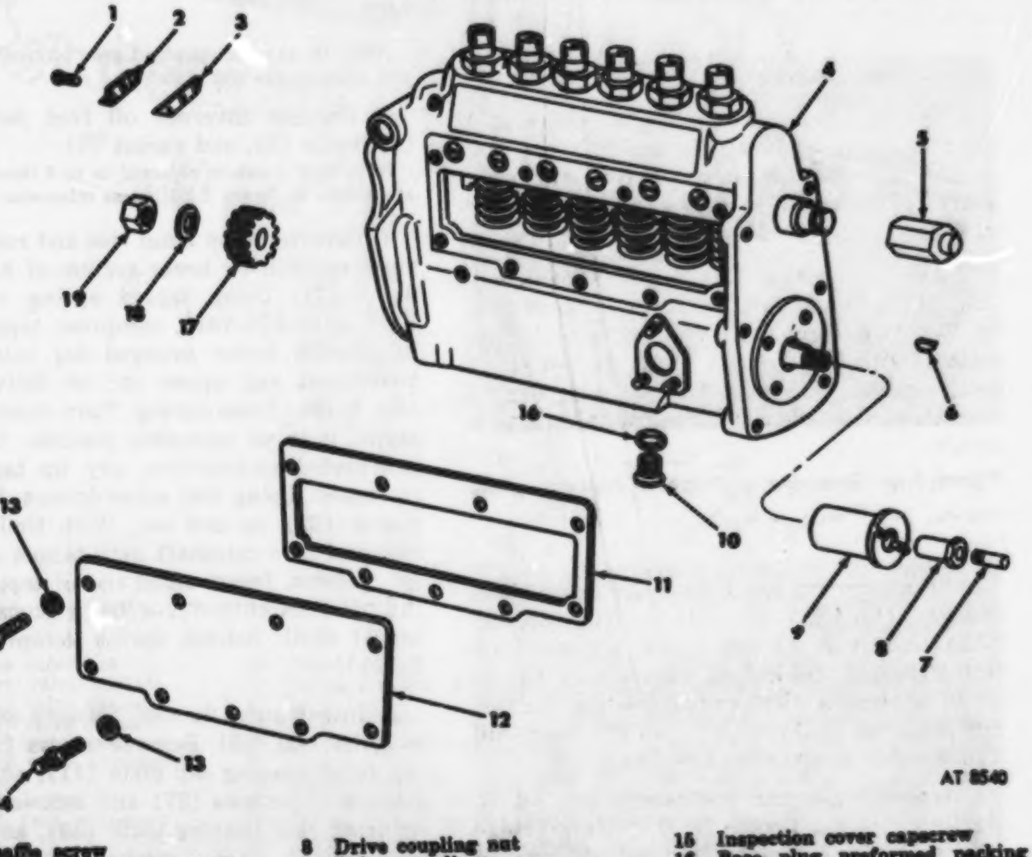
r. Assembly of Governor Model GVB 250/1050C 5479A is done in a similar manner, except as noted:

(1) Assemble front bearing retaining plate to governor shaft before pressing on front ball bearing (19). Securely clamp bearing in bearing support plate (17) to prevent outer bearing race from turning.

(2) No end play measurement is required as front bearing is clamped in position.

(3) To replace operating shaft bushings (12, fig. 7–15), press new bushings in place with suitable driver. Space between inner faces of bushings must be 2.308- 2.324 inches. Each bushing will extend .040- .042 inch beyond face of counterbore in housing. Do not ream bushings.

Section VII. REPAIR OF FUEL INJECTION PUMP



1	Oil baffle screw
2	Governor oil lubrication baffle
3	Baffle gasket
4	Injection pump housing
5	Control rack cap
6	Camshaft key
7	Drive coupling lockscrew
8	Drive coupling nut
9	Drive coupling
10	Base plug
11	Inspection cover gasket
12	Inspection cover
13	Lockwasher
14	Operating lever spring stud
15	Inspection cover capscrew
16	Base plug preformed packing
17	Governor drive gear assembly (slip clutch or solid hub)
18	Lockwasher
19	Governor drive gear nut

Figure 7–17. Fuel injection pump—partial exploded view.

7-30. General

This section covers the disassembly, cleaning, inspection, repair, and assembly of the fuel injection pump.

7-31. Disassembly

Note. Complete one operation before proceeding further, i.e., remove all plugs, all roller tappets, etc.

Note. Key numbers referred to in a through e below are found on figure 7-17.

a. Injector delivery valves are numbered from 1 to 6 starting at the drive end. As the pump is disassembled prepare six areas lined with a wax paper, or lintless paper, for each set of parts.

b. Clamp pump in a machinist vise equipped with soft brass or copper jaws, in an inverted position. Grip by the flats of the delivery valve nuts. Remove capscrews (15), stud (14), and lockwashers (13) securing inspection cover (12) and gasket (11). Discard gasket.

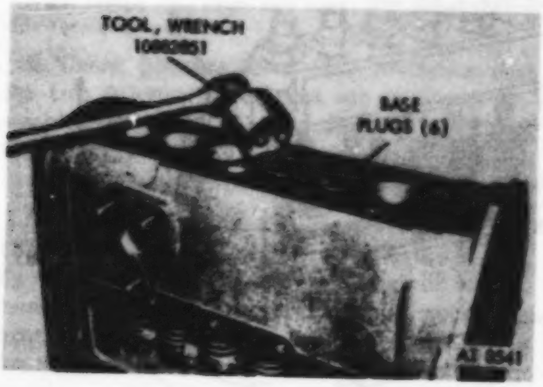


Figure 7-18. Removing or installing base hole plugs.

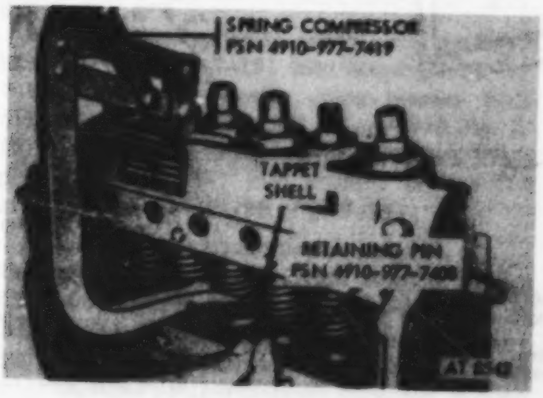


Figure 7-19. Installation of retaining pins.

c. Using prong wrench 10882851 (fig. 7-18), remove six bottom plugs (10) with preformed packing (16). If plugs are frozen, use small driftpin and light hammer and tap in a counterclockwise direction to break loose.

d. Remove lockscrew (7) and nut (8) securing drive coupling (9). Remove nut (19) securing governor drive gear assembly (17). Using suitable puller, remove drive coupling and camshaft key (6). Remove governor drive gear assembly using gear puller FSN 5120-977-7409.

Note. Do not use standard gear pullers. Such action will damage the slip clutch.

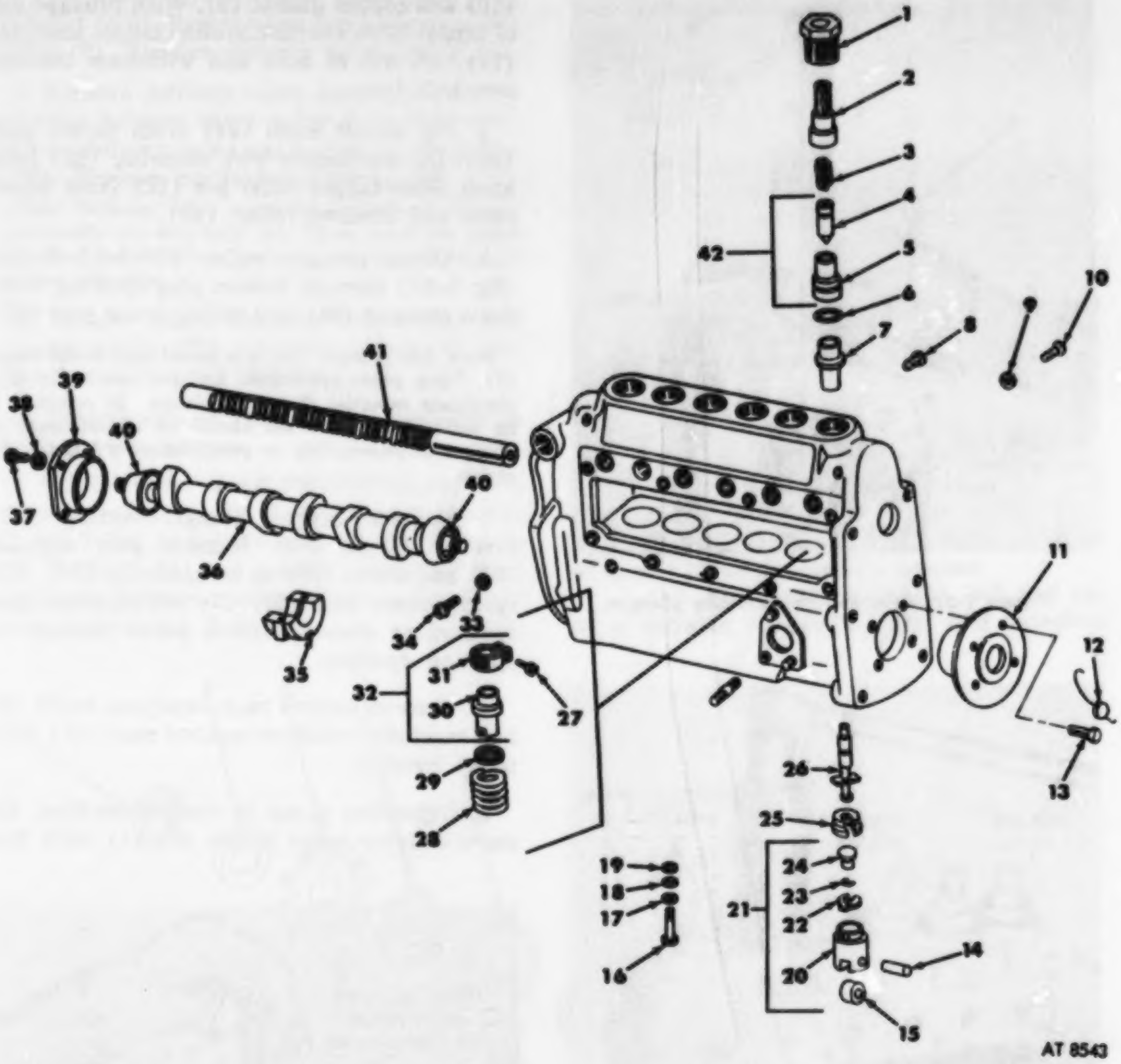
e. Remove governor oil feed baffle screws (1), baffle (2), and gasket (3).

Note. Key numbers referred to in f through p below are shown in figure 7-20 unless otherwise indicated.

f. Remove pump from vise and regrip in upright position by lower section of housing (4, fig. 7-17). Using tappet spring compressor FSN 4910-977-7419, compress tappet spring by placing lower pronged leg below spring lower seat and upper end on delivery valve (fig. 7-19). Raise spring. Turn camshaft until tappet is in an accessible position. Using narrow-bladed screwdriver, pry up tappet knob in tappet. Using two screwdrivers, lift timing spacer (22) up and out. With timing spacer removed turn camshaft until tappet is in highest position. Insert small end of tappet retaining pin FSN 4910-977-4708 in exposed hole in tappet shell. Release spring compressor (fig. 7-19).

g. Invert pump in vise. Remove and discard lockwire seal (12). Remove screws (13) securing front bearing cap plate (11), and remove. Remove capscrews (37) and lockwashers (38) securing rear bearing plate (39), and remove.

h. Remove capscrews (16), lockwashers (17), flat washers (18), and copper gaskets (19) securing camshaft center bearing (35). Carefully withdrawn camshaft (36) with center bearing from pump housing. Do not remove



1	Delivery valve nut
2	Delivery valve holder
3	Delivery valve spring
4	Delivery valve needle
5	Delivery valve body
6	Delivery valve preformed packing
7	Plunger barrel
8	Control rack stopscrew
9	Gasket
10	Tappet shell guide screw
11	Front bearing end plate
12	Lockwire seal
13	End plate screw
14	Tappet roller pin
15	Tappet roller
16	Center bearing capscrew
17	Lockwasher
18	Flat washer
19	Center bearing screw gasket
20	Tappet shell
21	Tappet assembly
22	Tappet timing spacer
23	Tappet knob retaining ring
24	Tappet knob
25	Plunger spring lower seat
26	Barrel plunger
27	Gear segment clampscrew
28	Plunger spring
29	Spring upper seat
30	Control sleeve
31	Control gear segment
32	Sleeve and gear assembly
33	Barrel locating screw gasket
34	Barrel locating screw
35	Camshaft center bearing
36	Camshaft
37	Rear plate capscrew
38	Lockwasher
39	Rear bearing end plate
40	Camshaft bearing cones
41	Control rack
42	Delivery valve assembly

Figure 7–80. Fuel injection pump—partial exploded view.

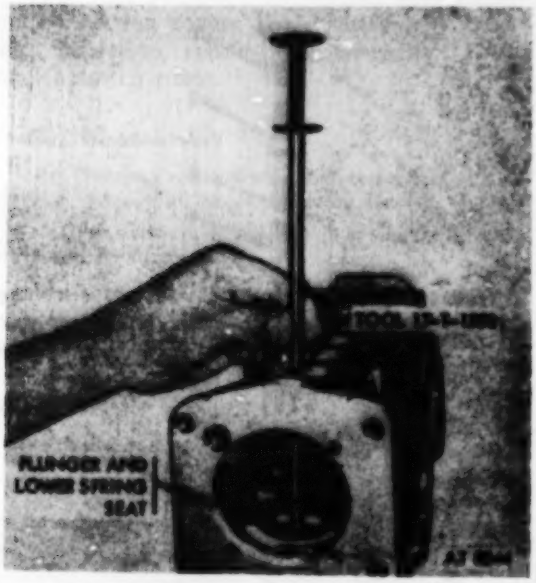


Figure 7-21. Removing or installing plunger.

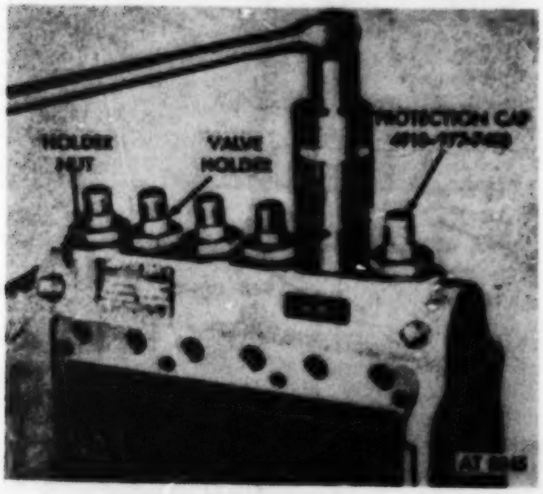


Figure 7-22. Removing or installing retaining nuts or valve holders.

bearing cones (40) from camshaft unles inspection indicates need to replace. Do not remove bearing cups from end plates.

i. Using plain end of tappet removal tool FSN 5120-977-7406, press down on tappet roller and remove tappet retaining pins installed in f above. Remove tappet guide screws (10) and copper gasket (9). With pronged end of tappet lifter snapped around tappet assembly (21), lift out of bore and withdraw through camshaft bore.

j. Pry tappet knob (24) from tappet shell (20). Do not remove wire snapring (23) from knob. Slide tappet roller pin (14) from tappet shell and remove roller (15).

k. Using plunger puller 76040-17-T-1550 (fig. 7-21) through bottom plug opening, withdraw plunger (26) and spring lower seat (25).

Note. The plunger (26) is a mated part to the barrel (7). These parts are lapped and precision-built. It is absolutely essential that each plunger be returned to its mated barrel. Do not handle by lapped areas of plunger as fingerprints or perspiration will cause corrosion.

l. Remove tappet plunger spring (28) through tappet bore. Remove gear segment (31) and sleeve (30) as an assembly (32) with spring upper seat (29). Do not separate gear segment or sleeve. Remove parts through inspection opening.

m. Remove control rack retaining screw (8) and carefully withdraw control rack (41) from pump housing.

n. Reposition pump in upright position. Remove delivery valve holder nut (1) with thin

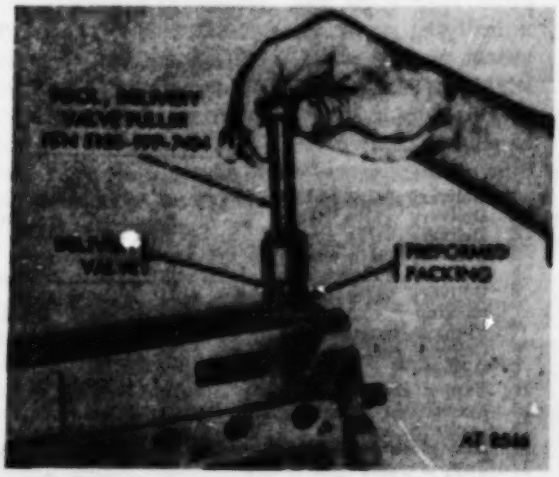


Figure 7-23. Removing or installing delivery valve assembly.

wall socket wrench (fig. 7-22). If socket will not fit between adjacent nuts, grind outer wall of socket to fit. Remove nut and delivery valve holder (2). Remove delivery valve spring (3).

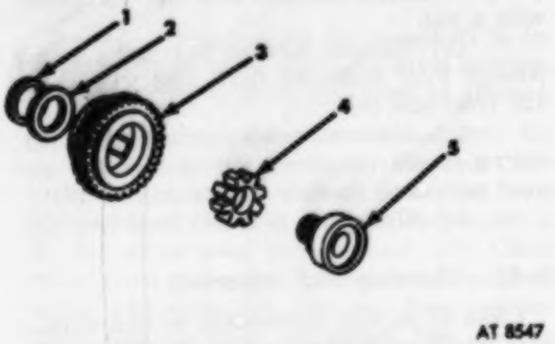
o. Remove delivery valve assembly (42) by screwing delivery valve puller FSN 5120-977-7404 to delivery valve and pulling upward (fig. 7-23). Remove preformed packing (6).

Note. Delivery valve assembly consists of delivery valve needle (4) and body (5). These parts are mated and must be handled similarly to the barrel and plunger assembly.

p. Remove barrel locating screws (34) and copper gaskets (33) retaining barrel (7). Remove barrel through delivery valve bore.

q. Disassemble clutch and drive assembly in the following manner:

(1) *Governor Model 5087B drive gear.* Remove snapring (1, fig. 7-24) securing spacer (2, fig. 7-24) and drive gear (3, fig. 7-24) to hub (5, fig. 7-24) and remove spacer and gear from hub. Remove rubber insert (4, fig. 7-24) from hub (5, fig. 7-24).



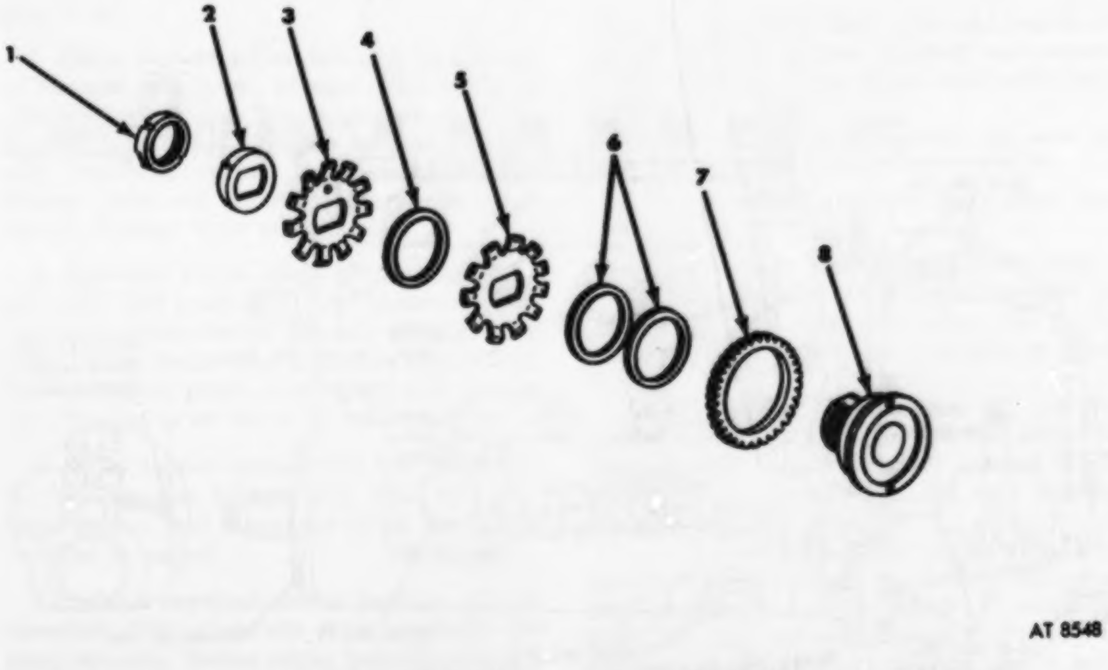
1 Snapring	4 Rubber insert
2 Spacer	5 Drive gear hub
3 Drive gear	

Figure 7-24. Friction clutch and drive assembly (Governor Model 5087B)—exploded view.

(2) *Governor Model 5479A.*

Note. Key numbers in a through d below are shown in figure 7-25 unless otherwise indicated.

(a) Mount gear assembly, hub end up, on a suitable tapered spindle (old injection



1 Locknut	3 Outer spring disk	5 Inner spring disk	7 Drive gear
2 Lockwasher	4 Inner spring spacer	6 Gear adjusting spacers	8 Drive gear hub

Figure 7-25. Friction clutch and drive assembly (Governor Model 5479A)—exploded view.

pump camshaft) clamped in a vise and secure with a nut.

(b) Remove locknut (1) using prong wrench FSN 5120-321-6517, and lockwasher (2) from hub (8).

(c) Remove outer spring disk (3), spring spacer (4), inner spring disk (5) and gear adjusting spacers (6) from hub (8).

(d) Slide drive gear (7) from hub (8).

7-32. Cleaning and Inspection

Clean all parts in drycleaning solvent or mineral spirits paint thinner. Inspect all parts for wear or damage. If control rack outer bushing is worn, use drive rod FSN 4910-977-7412 (2, fig. 2-7) to remove and install new bushing. Carefully inspect locknut and hub threads for damage. Inspect teeth and spring contact surface of gear for excessive wear. Inspect spring disks for distorted, cracked or broken segments. Remove minor burrs from drive gear with crocus cloth. If any parts indicate unserviceability, replace them.

Caution: **Handle all lapped parts with extreme care.**

7-33. Assembly

Note. **Complete one operation before proceeding further, i.e., insert all barrels before inserting delivery valves, etc.**

Note. **Key numbers referred to in a through j below are found on figure 7-20 unless otherwise specified.**

a. Clamp pump housing in upright position in soft-jaw vise. Carefully remove plunger (26) from the barrel (7) and insert barrel in pump. Aline the slotted side of the barrel with barrel locating screw hole. Replace barrel screw (34) and gasket (33). Torque to 50-55 lb in. Barrels should move freely in bore distance of slot.

b. Assemble new preformed packing (6) to delivery valve assembly (42). Make certain that the lapped upper and lower surfaces of the valve (4) are absolutely clean. Screw valve assembly into valve puller tool and insert into proper bore. Tap on tool to insure valve and preformed packing seating on barrel. Unscrew tool and replace delivery valve springs (3) and delivery valve holders (2). Secure with delivery valve holder nut (1). Torque to 85-90 lb ft.

c. Remove pump from vise and regrip in an

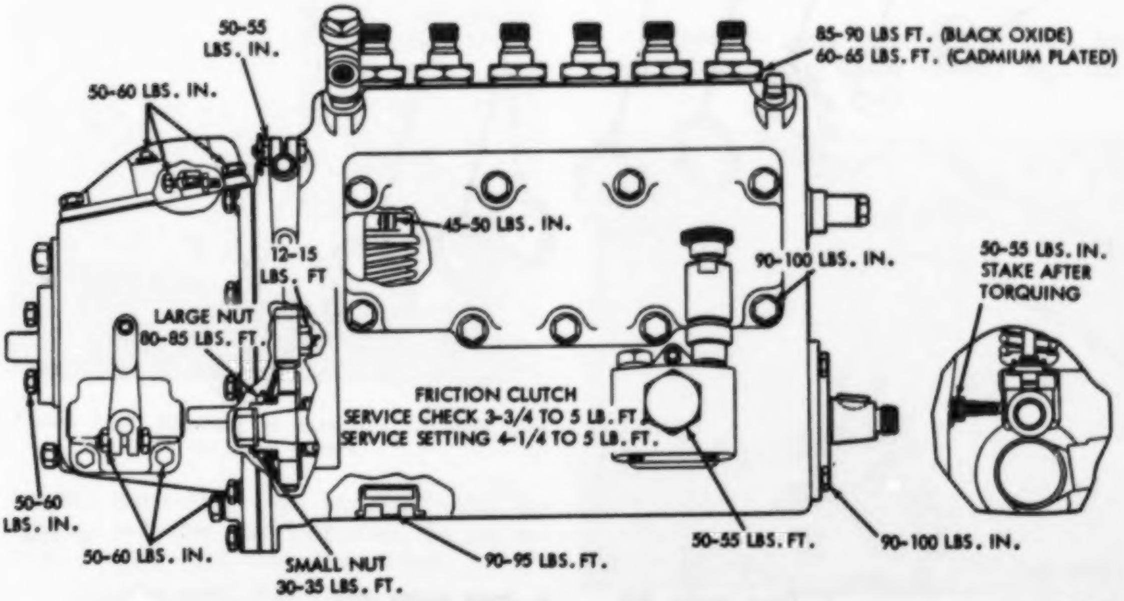

50-55
LBS. IN.
50-60 LBS. IN.
85-90 LBS FT. (BLACK OXIDE)
60-65 LBS. FT. (CADMIUM PLATED)
45-50 LBS. IN.
12-15
LBS. FT
90-100 LBS. IN.
50-55 LBS. IN.
STAKE AFTER
TORQUING
LARGE NUT
80-85 LBS. FT.
FRICTION CLUTCH
SERVICE CHECK 3-3/4 TO 5 LB. FT.
SERVICE SETTING 4-1/4 TO 5 LB. FT.
50-60
LBS. IN.
50-60 LBS. IN.
SMALL NUT
30-35 LBS. FT.
90-95 LBS. FT.
50-55 LBS. FT.
90-100 LBS. IN.
AT 8549

Figure 7-26. Injection pump and governor torque values.

inverted position. Examine control rack (41) for two punch marks near the ends.

Note. If mark is not found on shim screw end, measure .750 inch from end of rack, not shim screw, and scribe mark. Be careful mark does not bind in bushing.

Insert control rack into housing rack bore. Position rack so marks are equidistant from each face of pump. Replace control rack screw (8). Tighten securely and check movement of rack. Stake screw and recenter rack.

d. Assemble spring upper seat (29) to control sleeve and gear segment assembly (32). Insert through inspection window making sure gear screw (27) is parallel to control rack. Check control rack for free movement of sleeves.

Note. Scribed on the control segment and control sleeve are two calibration marks. If neither part was renewed one mark must be removed. Use fine file and remove mark from control sleeve.

***Caution:* Do not file near assembly area. Use clean, dry compressed air to remove all file chips before assembly.**

e. Insert plunger springs (28) through base plug bore.

f. Using plunger puller too, grip tappet end of plunger and insert plunger (26) partially into bottom opening. Rotate plunger until slot in yoke faces same direction as gear segment gap. Assemble spring lower seat (25) to plunger yoke and carefully insert plunger in barrel. Plunger must slide freely.

g. Assemble tappet shell (20), roller (15), pin (14), and knob (24). Use tappet removal tool and replace tappet through camshaft end bore. Do not install timing spacers at this time. Replace tappet guide screws (10) and gaskets (9). Torque to 50–55 lb in. and stake.

h. Screw tappet compressing tool 76040-17-T-1975 into one bottom plug hole, and compress tappet until tappet retaining pin can be inserted in tappet.

i. Position camshaft center bearinb (35) on camshaft (36). Carefully slide camshaft into pump housing. Secure center bearing with two screws (16), lockwashers (17), flat washers (18) and gaskets (19). Tighten securely.

Note. If camshaft bearings (40) were removed, they should be pressed onto shaft prior to inserting in housing.

***Caution:* Make certain the camshaft is installed with the drive end in the drive position. If reversed, engine-firing order will be affected.**

j. Install both end plates (11 and 39). Secure rear plate with screws (37) and lockwashers (38), torque to 50–60 lb in., and front plate with screws (13) torqued to 90–100 lb in., and retain using lockwire seal (12). Check bearing end play with dial indicator. Tap shaft to one end with soft hammer. Hold position and install indicator on tapped end. Tap in opposite direction. End play should be .004-.008 inch. If not, add or remove spacers from bearing end plate. Divide amount of movement between both camshaft bearings, if possible.

Note. Key numbers referred to in k through m below are found on figure 7-17 unless otherwise specified.

k. Replace bottom opening plugs (10) and preformed packings (16). Torque to 90–95 lb ft.

l. Assemble front drive coupling (9) with camshaft key (6). Secure with nut (8) and nut lockscrew (7). Torque to 90 lb ft.

m. Remove pump from vise and regrip in upright position. Rotate camshaft and remove tappet retaining pin as tappet rises sufficiently to free pin.

Note. Key numbers referred to in n (1) below are found on figure 7-24 unless otherwise specified.

n. To reassemble governor drive gear, proceed as follows:

(1) *Governor Model 5037B drive gear.*

(a) Assemble drive gear hub (5) to camshaft. Secure with lockwasher (18, fig. 7-17) and nut (19, fig. 7-17). Torque to 40–45 lb ft.

(b) Assemble drive gear (3) without rubber insert to hub (5). Install retaining snapring (1). Install necessary spacers (2) to provide a clearance of .001-.006 inch between snapring (1) and gear (3).

(c) Remove snapring (1) and gear (3). Lubricate rubber insert (4) with a multi-purpose grease and assemble to hub (5). Assemble gear (3) and necessary spacers (2) to hub (5). Install snapring (1), making sure it seats fully.

Note. Key numbers referred to in n (2) below are found on figure 7-25 unless otherwise specified.

(2) *Governor Model 5749A drive gear.*

(a) Use new friction clutch kit 76040-204SB14 when assembling drive gear.

(b) Assemble hub (8) to camshaft. Key is not required. Secure with nut (19, fig. 7-17) and lockwasher (18, figure 7-17). Torque to 30-35 lb ft.

(c) Assemble gear (7) to hub (8). Stack two spacers (6), spring disk (5), .035-inch spacer (4), and spring disk (3) with one ⅛-inch hole on drive hub (8). Secure with new locknut (1) and lockwasher (2). Torque to 80-85 lb ft.

Note. Outer spring disk (3) has .125-inch hole.

(d) Lubricate with clean OE-30 motor oil. Drive gear should slip when 4¼-5-lb ft torque is applied to it. Use torque adapter lever 76040-17-T-11421 with spring scale FSN 6670-526-8706.

(e) Adjust friction clutch torque by inserting or removing adjusting spacers (6) between inner spring (5) and drive gear (7). Always retorque to 80-85 lb ft before checking torque.

(f) When correct, stake lockwasher (2) at two diagonal spots.

Section VIII. REPAIR OF INJECTOR NOZZLE AND HOLDER ASSEMBLY

7-34. General

This section covers the disassembly, cleaning, inspection, repair, and assembly of the injector nozzle and holder assemblies.

7-35. Disassembly

Note. Key numbers in a through g below are shown in figure 7-27 unless otherwise indicated.

Note. Nozzle gasket (5) and nozzle assembly (3) are not component parts of nozzle holder assembly, and are ordered separately.

a. Secure nozzle holder body (1) in a soft-jawed vise. Remove retaining screw (18). Remove retaining screw gasket (17), fuel return line inlet (16), retaining screw gasket (15), fuel return line outlet (14), and retaining screw gasket (13) from nozzle assembly (3). Discard gaskets (17, 15, and 13).

b. Remove protection cover (12) and protection cover gasket (11) from nozzle assembly (3). Discard gasket.

c. Loosen pressure adjusting locknut (10) and turn pressure-adjusting screw (8) in a counterclockwise direction until it turns freely, indicating that all pressure-adjusting spring (7) tension has been relieved.

d. Remove pressure-adjusting locknut (10). Remove spring retaining nut (9), pressure-adjusting screw (8), and pressure-adjusting spring (7).

e. Remove nozzle holder body from vise and remove spindle assembly (6) by inverting the nozzle holder body and allowing spindle assembly to fall free.

f. Remove gasket (5) from nozzle holder body (1). Discard gasket (5).

g. Secure nozzle holder body (1) in a soft-jawed vise. Remove nozzle capnut (4) with 12 point ¾-inch deep socket wrench. Remove nozzle assembly (3).

Caution: **Use extreme care when removing nozzle assembly (3) to prevent damage to lapped surfaces. Do not allow needle or nozzle to contact any hard surfaces. Reinstall the nozzle capnut loosely after the needle and nozzle have been removed, to protect the lapped surface of the nozzle holder body.**

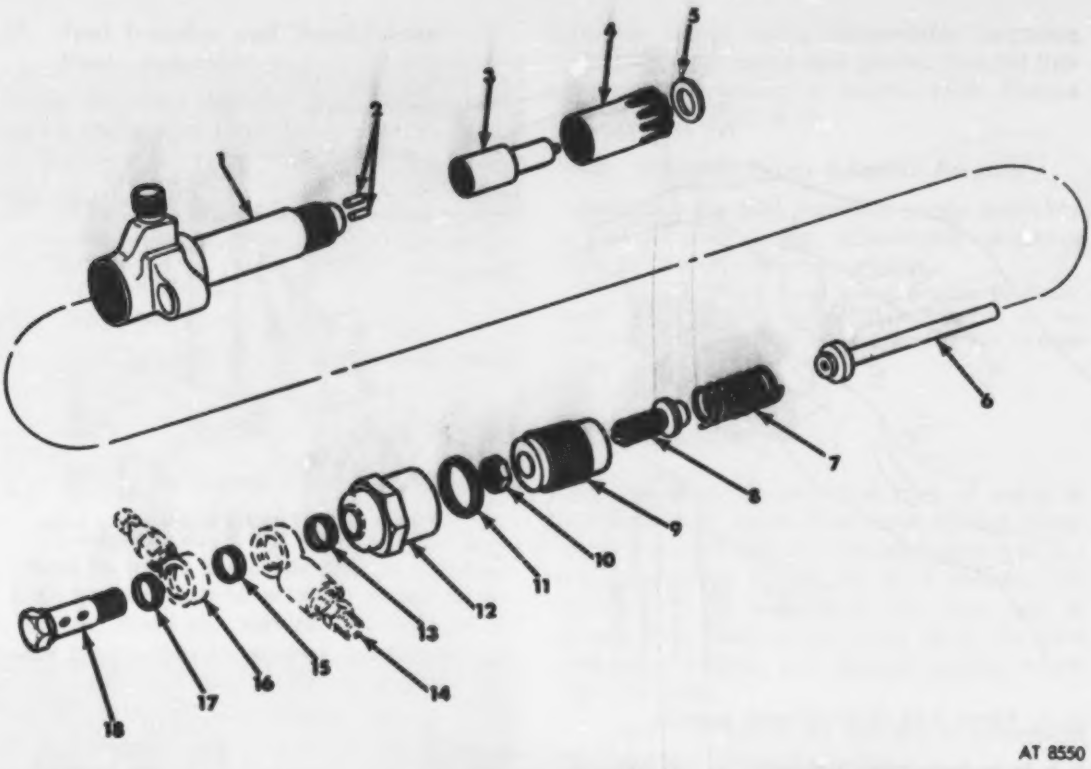
7-36. Cleaning

a. Soak the nozzle and valve in a carbon-removing solvent. Remove remaining exterior carbon deposits with brass wire brush FSN 4910-977-7405, as shown in figure 7-28. Scrape carbon deposits from inside nozzle pressure chamber using scraper 76040-17-T-1896 (3, fig. 2-7).

Caution: **Under no circumstances should a knife, sharp tool, or abrasive material be used to clean carbon from the nozzle or valve.**

b. Clean carbon from nozzle spray holes using appropriate cleaning needle FSN 4910-977-7407, retained in pin vise FSN 4910-977-7416 as shown in figure 7-29.

Caution: **Use care in cleaning nozzle holes to avoid breakage of probe in holes.**



1 Nozzle holder body
2 Locating pin
3 Nozzle assembly
4 Nozzle capnut
5 Gasket, nozzle
6 Spindle assembly
7 Pressure-adjusting spring
8 Pressure-adjusting screw
9 Spring retaining nut
10 Pressure-adjusting locknut
11 Protection cover gasket
12 Protection cover
13 Retaining screw gasket
14 Fuel return line outlet
15 Retaining screw gasket
16 Fuel return line inlet
17 Retaining screw gasket
18 Retaining screw

Figure 7-27. Fuel injector nozzle and holder assembly—exploded view.

c. Clean the remaining components in drycleaning solvent or mineral spirits paint thinner. Dry with low-pressure dry compressed air.

7-37. Inspection

Note. All defective parts are cause for replacement.

a. Inspect nozzle assembly for wear, distortion, and pitting. Inspect the highly polished surfaces for scratches and discoloration. Check fit of needle in nozzle. The needle must slide freely to its seat. Check nozzle holes for oversize or obstructions. Holes must not be larger than 0.0128-inch diameter.

b. Inspect pressure-adjusting spring for cracks, distortion, or evidence of wear. Inspect spindle assembly for straightness within 0.010-inch total indicator reading.

c. Check threads on pressure-adjusting screw, pressure-adjusting locknut, and nozzle capnut, for condition. Replace nozzle holder when threads are stripped or damaged beyond repair.

7-38. Repair

Repair of the fuel injector nozzle and holder assembly is limited to thorough cleaning, inspection, and replacement of gaskets. If other parts are found to be unserviceable, replace the nozzle assembly or nozzle holder, or both.

7-39. Assembly

Note. The fuel injector nozzle is precision-built and its assembly requires extreme care. The nozzle and needle must be absolutely clean and free from grease deposits such as finger stains. Unless the holder assem-

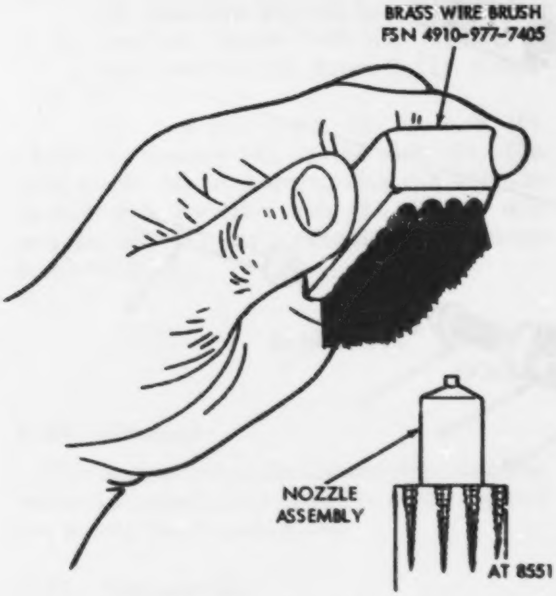

BRASS WIRE BRUSH
FSN 4910-977-7405
NOZZLE
ASSEMBLY
AT 8551

Figure 7–28. Cleaning nozzle assembly.

bly is to be immediately reinstalled on the engine, it should be stored in a suitable container to prevent the entrance of dirt or moisture after testing. For proper fuel balance between cylinders, the nozzle assembly must be assembled to its original holder. Do not mix nozzle assemblies and holders.

a. Assemble the injector nozzle and holder assembly in reverse order of disassembly (par. 7–35).

Caution: **Relieve all nozzle spring tension before assembling the nozzle to the nozzle holder to avoid damaging the locating dowel pins. The two dowel pins must be carefully alined with the holes in the nozzle to insure proper positioning of the spray holes.**

b. To prevent valve stem breakage, it is essential that the nozzle be perfectly centered in the protection cover. Centering sleeve 17–T–11104 (fig. 7–30) is used for this purpose, and is placed over the nozzle with the tapered end centering nozzle in nozzle capnut during initial tightening. During final tightening of nozzle caput, the sleeve must be removed to prevent binding. Torque to 50–55 lb ft.

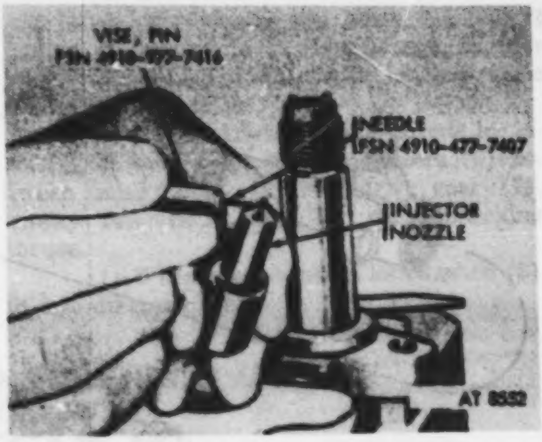

VISE, PIN
FSN 4910-977-7416
NEEDLE
FSN 4910-477-7407
INJECTOR
NOZZLE
AT 8552

Figure 7–29. Cleaning nozzle spray holes.

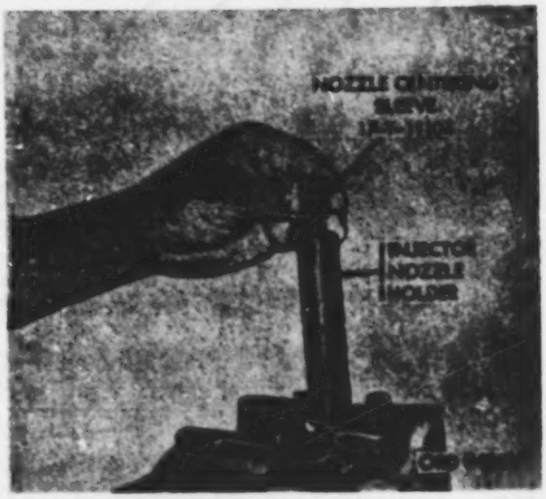

NOZZLE CENTERING
SLEEVE
INJECTOR
NOZZLE
HOLDER

Figure 7–30. Centering sleeve.

Section IX. ASSEMBLY OF SUBASSEMBLIES

7–40. General

This section covers the assembly of the fuel injection system subassemblies. Caution must be taken during assembly to keep parts and equipment free from all dirt and other abrasive matter (par. 7–5).

7–41. Fuel Transfer and Hand-Primer Pump Assembly

Install the fuel transfer and hand-primer pump on the fuel injection pump following disassembly sequence (par. 7–8), and using new gasket.

Note. The fuel transfer pump must be tested prior to installation on the injection pump. See paragraph 7–45.

7–42. Governor Assembly

Assemble the governor assembly to the fuel injection pump, using disassembly sequence (par. 7–11) and using new gasket. Control link pin must be engaged in control rack. Torque capscrews to 50–60 lb in.

7–43. Injection Pump Adapter Assembly

Assemble the fuel injection pump assembly to the adapter, using disassembly sequence (par. 7–7) and using new gasket.

Note. The injection pump assembly must be tested, timed, and calibrated before it is installed on the adapter. The pump must be assembled to the adapter before installing on the engine.

Section X. TESTS AND CALIBRATION

7–44. General

a. All components of the fuel injection system must be tested and calibrated, or adjusted in a systematic method prior to installing on the engine. Since the nozzles are required to test the pump, they themselves must be tested first. The governor speed settings cannot be obtained until the injection pump fuel flow has been established.

b. The nozzle holders and injection pump assembly are installed as a matched set on the original manufactured engine. Each nozzle holder carries the last three figures of the injection pump serial number. They are also numbered to the cylinder location. By mating the proper nozzle holders with the correct pump and in proper order, results obtained on the calibration stand will be duplicated when installed on the engine. Failure to do this may result in an unbalanced fuel delivery.

7–45. Fuel Transfer and Hand-Priming Pump

Note. Key numbers in a, (1)–(4) below refer to figure 7–14, unless otherwise specified.

a. *Pressure Test.*

(1) Remove tappet shell pin (5), and remove tappet assembly (29) and tappet spring (4) from fuel pump housing (6). To prevent loss of spindle during leakage test, insert a ⅛-inch diameter pin through the two holes in base of housing tappet guide.

(2) Close outlet side of pump with a ¼-inch pipe plug. Connect fuel inlet of pump to fuel nozzle test stand. Pump test oil into pump to a pressure of 300 psi. The minimum time for a pressure drop to 150 psi is 10 seconds. Oil leakage will be evident at the open end of spindle bore. Also, at this time, check the inlet and outlet valves, and plunger spring screw (23) for leaks.

(3) If excessive oil leakage is evident at the spindle, replace the spindle.

(4) Remove ⅛-inch diameter service pin from base of housing tappet guide. Install tappet spring (4) and tappet assembly (29) in housing (6), and retain using tappet shell pin (5). Stake the tappet shell pin (5) slightly at each end of pin.

b. *Operating Test.*

(1) The operating test is made with the fuel transfer pump and hand-priming pump installed on the injection pump mounted in the calibration stand.

(2) Connect test stand fuel tank to pump inlet port. Install a 0–60–psi pressure gage in the return line. Operate test stand.

(3) Fuel transfer pump must deliver 20 psi or greater pressure.

Note. In the absence of pressure, the pump may be air-locked. Loosen the outlet valve spring retaining screw sufficiently to bleed out all air. Retighten screw.

(4) With the fuel injection pump at rest, drain fuel lines and reconnect. Stroke hand primer until fuel flows. If more than 30 strokes are required or if stem leaks, replace piston packings.

7-46. Testing Hole-Type Nozzles

***Warning:* The penetrating power of atomized oil under pressure is sufficient to puncture the skin and may cause blood poisoning. Therefore, hands must be kept away from a spraying nozzle.**

a. Attach nozzle holder assembly to correct size test stand. Close the pressure gage valve to protect the gage and actuate the test stand lever rapidly (about 25 strokes per min) to expel air from the nozzle and holder, and to "settle" the spring and nozzle loading column. Open the pressure gage valve one-half turn and depress the operating lever slowly to raise pressure. Observe nozzle opening pressure on gage. If opening pressure is other than 2,300 psi, adjust to correct setting.

Note. Protection cover must be removed and locknut loosened prior to making adjustment. When adjusted, secure locknut.

b. When a new pressure-adjusting spring is used, adjust the opening pressure 10 percent higher than specification to allow for spring set.

c. Actuate the operating lever slowly to build up pressure, and as the correct opening point is approached, observe the spray orifice of the nozzle. If drops of fuel form or oil issues as a stream at pressures 100 psi below the opening pressure, the nozzle is leaking and must be replaced.

d. If the assembly passes the leakage test without leaking, the spray pattern should be examined. Close the gage valve to protect the gage when lever of test stand is actuated rapidly.

Note. Make sure that all holes are open and appear to be spraying the same quantity of fuel.

e. Operate lever at a rate of approximately 15 strokes per minute. The spray formation should be sharp with a rather solid pattern, and the angles formed by the individual sprays should be uniform. (See figure 7-31).

f. Usually the spray of a hole-type nozzle will be satisfactory if the valve seat is tight, valve free, and all spray orifices clean. However, if the nozzle is not in good operating condition, the spray pattern will be poor. (See figure 7-31). If the spray pattern cannot be corrected, the nozzle should be replaced.

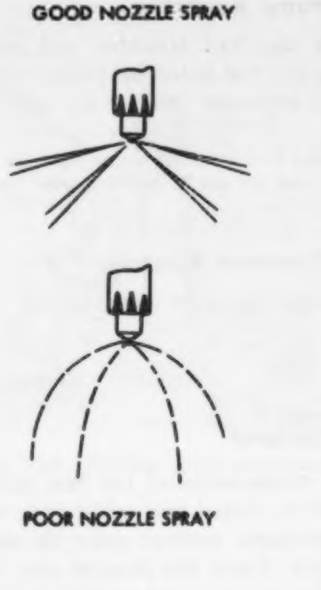


Figure 7-31. Nozzle spray patterns: Top—good nozzle spray; lower—poor nozzle spray.

g. The nozzle chatter must be distinct and regular. A sharp, pitched sound *is not mandatory*, and an occasional *skip or variation* in the chatter pitch sound is acceptable.

h. The "chatter" test requires that the stroke of the test handle take approximately two seconds. This must be performed with the test stand pressure gage out of the line (valve shut off).

7-47. Internal Timing

a. Whenever a fuel injection pump has been completely disassembled and reassembled, it is necessary that both internal timing and calibration of the pump be checked even though none of the components were replaced. Internal timing for the Mack ENDT 673 engine injection pump is timed for port closing, or the time the upper end of the plunger completely covers the fuel inlet holes in the barrel and no fuel flows from the delivery valve. Each delivery valve must close sixty degrees, plus or minus one-half degree, apart in firing order sequence, to be properly timed.

b. To time an injection pump, a test stand

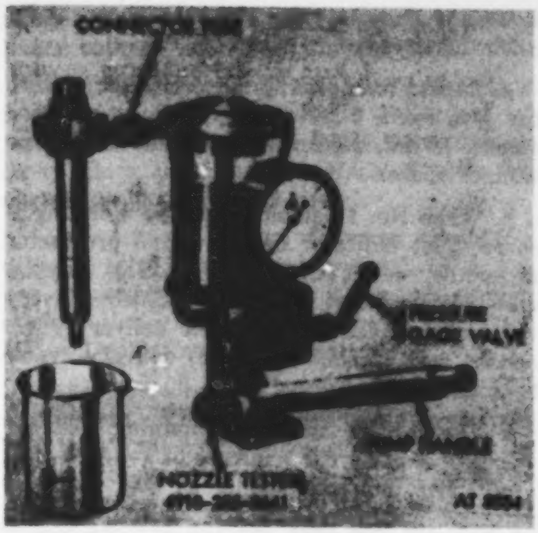

GAGE VALVE
NOZZLE TESTER

Figure 7–32. Nozzle test stand.

equipped with a coupling having a 360-degree protractor and pointer FSN 4910–981–2770 (see figure 2–3, item 3) is required to check the 60-degree intervals. In addition, a dial indicator and modified delivery valve holder is required to check plunger lift to cutoff point. Enlarge delivery valve holder bore to .156 inch.

c. Assemble pump to test stand, using flange adapter FSN 4910–981–2771. See figure 7–33. Block operating lever in full open position. Remove side inspection cover. Remove No. 1 delevery valve holder and nut. Also remove delivery valve spring and needle. Needle may be easily removed by pumping fuel to lift the needle from the valve. Install modified delivery valve holder and nut. Carefully insert .125-inch diameter rod through hole until it rests on plunger. Rod must be 3½ inches or longer. Assemble dial indicator to read stroke, and set

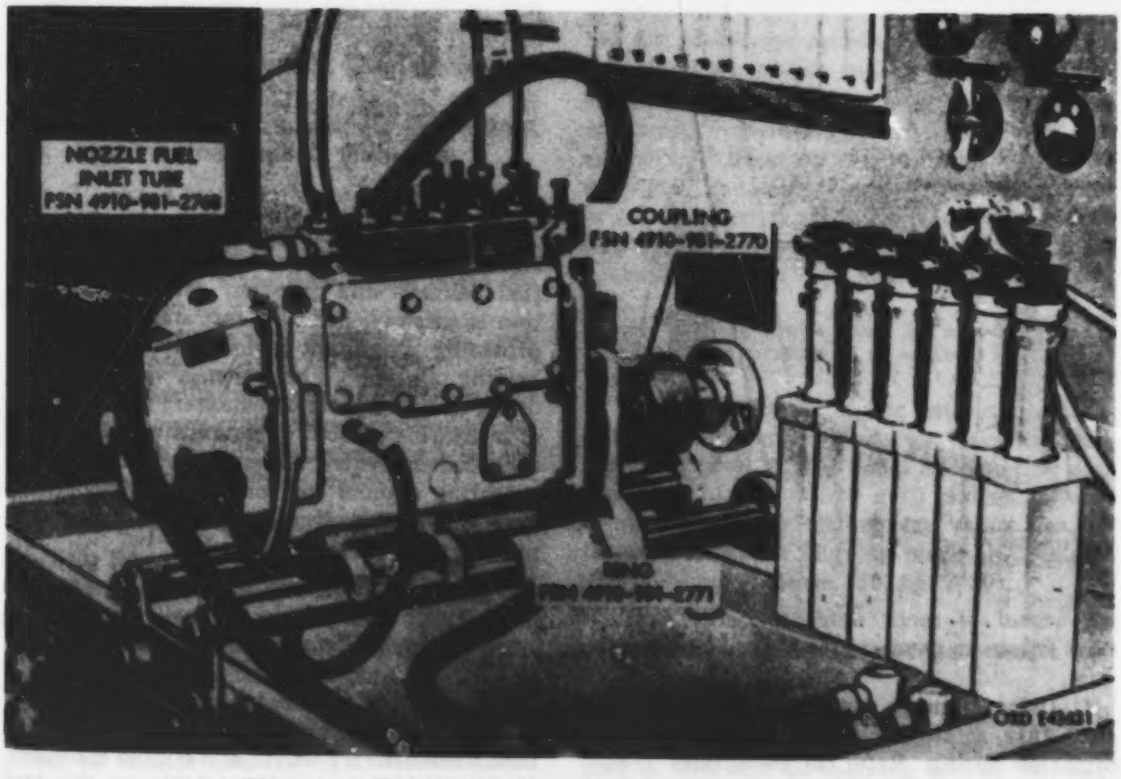

NOZZLE FUEL
INLET TUBE
FSN 4910-981-2768
COUPLING
FSN 4910-981-2770
RING
FSN 4910-981-2771

Figure 7–33. Fuel injection pump assembly mounted on test stand.

dial at zero for lowest portion of stroke. See figure 7–34.

Note. The delivery valve needle is a lapped and mated part to the valve body. Do not handle the lapped surfaces.

d. Provide for fuel flow by hand supply pump, gravity feed or test stand pump. Attach fuel line to injection pump. Fuel should flow from No. 1 delivery valve. Rotate pump in a clockwise direction, when viewed from front, until fuel flow ceases. Wipe fuel from holder to better observe fuel action. Fuel will cease the instant the plunger covers the fuel inlet port. Read dial indicator.

e. If no timing spacers are in the pump the reading will be greatly above specifications. Spacers are not always inserted at the time of pump rebuilding. Timing spacers are obtainable in .050-, .054-, .058-, .062-, and .066-inch thicknesses. When properly timed, fuel will cease when plunger rises 118 plus .010 inch, minus .004 inch.

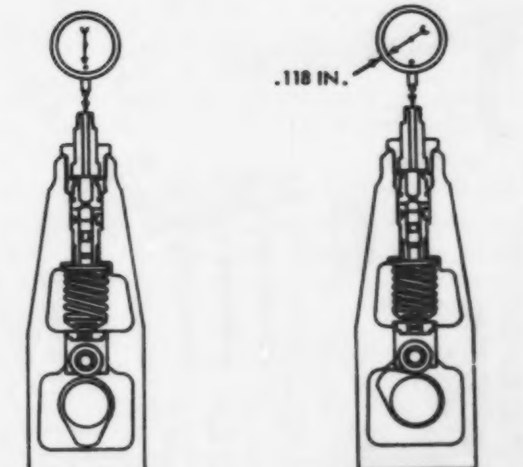


Figure 7–34. Port-closing dial indicator.

f. Using plunger spring compressor FSN 4910–7419, rotate camshaft to lower tappet and compress spring. Refer to paragraph 7–31d. Using two narrow screwdrivers, raise tappet knob and insert proper tappet spacer under knob. Remove spring compressor.

g. Repeat test, setting dial indicator at zero for low point. Fuel should cease at specified stroke. If not, replace spacer with thicker or thinner spacer.

h. When No. 1 delivery valve port closing is correct, set indicator on test stand protractor at zero degrees at point of port closing. Remove dial indicator, test rod, and modified delivery valve holder. Carefully replace delivery valve needle and spring. Replace delivery valve holder and nut. Torque to 85–90 lb ft.

i. Proceed to time of remaining delivery valves in firing order sequence of 1–5–3–6–2–4. Test stand indicator should be 60°, ±30′, at point of port closing. Each additional valve must be timed to a multiple of 60°, ±30′.

j. After timing all delivery valves, check plunger for bottoming on delivery valve by rotating camshaft until No. 1 plunger is at highest position. Using narrow screwdriver pry up on plunger. Plunger must be free to move. If plunger is against delivery valve, retime pump, using thinner spacer.

7–48. Fuel Injection Pump and Governor Assembly Calibration

a. *General.*

(1) After assembly and timing of the fuel injection pump it is necessary to calibrate the fuel delivery and governor settings. Calibration is accomplished on a test stand capable of providing a constant temperature heated calibrating oil, pump lubrication, a variable speed drive, a delivery stroke counter, and a means of measuring amount of fluid delivered through each delivery valve. As each stand differs, see operating manual for correct pump mounting method and operating procedures. Calibrating procedure is alike on all stands.

(2) The injection pump must be calibrated with the nozzles that will be installed on the engine. When a pump is overhauled the nozzle holder has stamped on its body the last three numbers of its injection pump serial number. It also is numbered 1 through 6 to match the delivery valves and engine cylinders. If the nozzles are not available or the test

stand has no provision for nozzles, the fuel delivery balance may be slightly affected.

(3) Calibration of the pump should be made using a set of engine size and length injection delivery tubes. See figure 7-33. The delivery lines used on the Mack ENDT 673 engine are .067 ID x .25 x 30.

(4) Amount of fuel delivered through a delivery valve is measured by cubic millimeter per stroke or, as commonly written, mm³/stroke (1000 mm³ = 1 millimeter (ML); 1 ML = 1 cubic centimeter (cc)).

(5) The collection tubes are graduated in centimeters. When running tests, be certain that the number of strokes called for will not exceed the capacity of the collection tubes. If 1,000 strokes are called for to provide a delivered amount and the tube will not hold it, reduce test to 500 strokes and halve the required delivery.

b. *Testing Delivery Valve Springs.*

(1) Mount pump on test stand. Attach fuel delivery tubes to pump but leave other end free. Remove fuel overflow valve and install plug. Attach nozzle tester to fuel inlet port.

(2) Rotate camshaft until No. 1 is at highest position. Provide catch containers for each tube.

(3) Pump tester until one of the delivery valve springs unloads and fluid flows from a tube. Allow pressure to drop, and repeat test. Pressure on gage when flow begins is the delivery valve spring tension.

Note. The delivery valve should open when gage reads 200-400 psi.

(4) Assemble tube which delivered fuel to its respective nozzle and repeat until all except No. 1 has been tested. Rotate camshaft 180 degrees to test No. 1 delivery valve.

c. *Injection Pump Delivery Test.*

(1) Remove control rack shim pack and capscrew from drive end of injection pump. The capscrew is secured with a roll pin driven halfway through the control rack. To remove pin, rock screw back and forth with 7/16 box wrench. If pin has not loosened and worked up, twist the screw to snap the pin, and use pin punch to remove pin. Screw can be removed with screwdriver.

(2) Adjust adjustable special rack extension gage (fig. 2-10) with depth micrometer to 1.223 inch. Lock nut and recheck depth. Screw gage to control rack cap spud, flush to pump housing. Move control rack to gage stop and lock in place.

(3) Remove pump side inspection cover. Remove governor top cover and cam stop bridge (9, fig. 7-15). Assemble test stand lubrication oil supply and return lines. Replace overflow valve. Connect calibrating oil feed line to injection pump supply pump, and the supply pump to the injection pump. Connect calibrating oil return line to the overflow valve.

(4) Start test stand and run pump at 1,000 rpm for 15-20 minutes to stabilize the calibrating oil temperature. When using calibrating oil with No. 2 diesel fuel with API gravity of 35-37°, temperature must be 105° F, plus or minus 5° F. When using calibrating oil, such as Orpex or Gulf 45, increase delivery by 1.08 percent.

Note. It is recommended that calibrating oil be used instead of diesel fuel. Calibrating oil has preservative properties which will protect the pump and nozzles if they are not installed immediately.

(5) With proper fuel temperature at the gallery outlet, set stroke counter for 500 strokes and pump speed at 1,000 rpm. Run test and spill out. Calibration test must be made with wet tubes and lines. Reset stroke counter for 500 strokes and run test. Each tube should read 64.5 cc, plus or minus 1½ percent. Maximum deviation between high and low tube is 3 percent.

Note. Running a wire along the row of tubes will cause the foam to settle so an accurate heading may be obtained.

(6) If delivery is not within specifications, adjustment is made by loosening gear segment screw (27, fig. 7-20) and rotating gear segment (31, fig. 7-20) until proper delivery is obtained. After all delivery valves are adjusted, scribe new aligning mark on gear segment or control sleeve (30, fig. 7-20).

(7) Run test three times to insure accurate readings. Use test sheet to record each reading.

d. *Governor Calibration and Adjustment.*

Note. All governor calibrations and adjustments must be made with the operating lever in "full load" position, unless otherwise noted.

(1) Remove rack stop gage. Start pump delivery and set at 1,000 rpm. Set stroke counter for 500 strokes and run test. Adjust the full-load stopscrew (32, fig. 7–15) to provide 64.5 cc ± 1.5 percent. Shut off pump drive.

(2) Replace cam stop plate bridge. Adjust cam nose to provide a 90-degree angle with stop cam (26, fig. 7–16). Stop plate should be adjusted to provide the initial .080-inch nose clearance.

(3) Start pump drive and set for 1,000 rpm. Cam nose should be in contact with the cam stop plate. Run a 500-stroke delivery test. Delivery should be as in 1 above. If not, adjust the cam stop to obtain required delivery.

(4) Increase pump speed up to 1,080 rpm. Adjust full-load adjusting stopscrew to cause cam nose to break contact with the stop plate. Stop the pump drive. Check cam for 90-degree angle to stop plate.

(5) Start pump and run at 1,000 rpm. Set counter for 500 strokes and run a calibration test. Delivery should still be same as in 1 above. If it is not, then adjust the stop cam plate for proper delivery volume.

(6) Any time that a change is made in the stop plate setting, repeat those procedures in 4 and 5 above.

(7) Start pump drive and set for 700 rpm. Run a 500-stroke delivery test at the full-load position. Adjust the droop screw (28, fig. 7–16) to delivery 67.5 ± 1.5 percent. Stop pump drive and check cam nose angle. If this angle is not 90 degrees, readjust and re-run those tests explained in 3 through 7.

(8) Start pump and set speed for 250 rpm. Move the operating lever to an idle position. Set stroke counter for 500 strokes. Adjust the idle stopscrew to delivery 10 ± 2 cc.

(9) Shut down the injection pump test stand.

(10) Since the rack extension is controlled by the stop plate position, one pump may differ from another in the calibrated pump rack extension. To provide a common field checking point, each pump rack will be shimmed providing a common rack extension of 1.453. Actuate operating lever several times through full range to center sleeves. Place the operating lever in a full-load position and screw rack extension gage to rack cover speed. Adjust the gage screw to contact rack, and lock in position. Remove gage and check the unshimmed rack extension with a depth micrometer. The difference between unshimmed rack extension and 1.453 must be made up using a new rack screw and necessary shims. Assemble shims and screw to rack, and regage after tightening but not pinning screw. Alter shims to obtain 1.453 rack-setting at full-load position. This extension is commonly known as the static rack extension.

(11) With proper number of shims installed, screw must be pinned to prevent workout. Using No. 52 drill (.0635), drill hole .469 inch deep using hole in rack for pilot hole. Insert new roll pin.

Note. Do not drill or install pin until shim pack is correct and capscrew is securely tightened.

(12) Again move operating lever through its range several times and then hold in full-load position. Measure cam nose to stop plate gap with feeler gage. Stamp this figure on upper left-hand corner of governor housing side for field checking.

(13) Remove injection pump from test stand. Remove nozzles and place with pump.

Note. To prevent excessive diesel smoke and provide more efficient engine operation, in high-altitude operation, the injection pump rack may be reset to provide reduced rack travel.

(14) Full throttle rack extension is measured with rack shims and screw in place. Tabular data below indicates the reduced rack travel for the higher elevation at which vehicle will normally operate. To reduce rack travel, remove control rack cap (fig. 7–17), key 5) and replace with rack setting extension gage (fig. 2–10) adjusted to proper setting with a depth micrometer. Remove the governor cover (43, fig. 7–15). Hold operating lever in full-load position until rack extension bottoms the rack setting tool. Adjust cam stop plate (41, fig. 7–15) to provide .080-inch cam-to-cam stop plate clearance. Lock stop plate nuts and replace governor cover. Remove tool and install rack protection cover. The following are throttle rack adjustments:

Altitude (ft)	*Full throttle rack extension (in.)*
0–4000	1.453
5000	1.446
6000	1.439
7000	1.432
8000	1.425
9000	1.418
10000	1.411

7–49. Fuel Injection Pump Specifications

Listed below are the specifications used in testing the injection pump:

Fuel **35–37 API gravity**
105°±5° at pump gallery outlet

Nozzle pressure .... 2,300±50 lb

Rack static extension .... 1.453 in.

Calibration..... @ 1000 pump rpm, 129 mm^3/
1000 strokes, ±1.5%
variation between high and low, 3%
@ 700 pump rpm, 135 mm^3/
1000 strokes, ±1.5%

Calibrating with Orprex calibrating fluid (105°±5° F at pump gallery outlet) ......
@ 1000 pump rpm, 130.4 mm^3/
1000 strokes, ±1.5%
variation between high and low, 3%
@ 700 pump rpm, 136.4 mm^3/
1000 strokes, ±1.5%

CHAPTER 8

CLUTCH AND ASSOCIATED PARTS

Section I. GENERAL

8–1. Scope

This chapter contains detailed description, procedures, and technical information necessary for disassembly, cleaning, inspection, repair, and assembly of the clutch and associated parts.

8–2. Description and Operation

The single-plate, dry-disk clutch unit (fig. 8–1) is secured to the rear of the engine flywheel by 12 capscrews. When installed on the powerplant, the clutch is completely enclosed by the flywheel housing and the clutch housing which is bolted to the front of the transmission. The clutch provides a method of connecting and disconnecting the engine from and to the transmission. This is necessary for changing from one gear ratio to another without stripping or clashing of gears, and also for permitting operation of the engine when the vehicle is standing still. Depressing the clutch pedal causes the release fork to move the release bearing forward on the transmission input shaft and contact the release levers. Pressure of the bearing on the release levers overcomes the pressure of the compression springs on the pressure plate. Therefore, when the clutch pedal is fully depressed with the linkage properly adjusted, the clutch is fully released. When the clutch pedal is fully released, the clutch is fully engaged and engine torque is transmitted to the transmission.

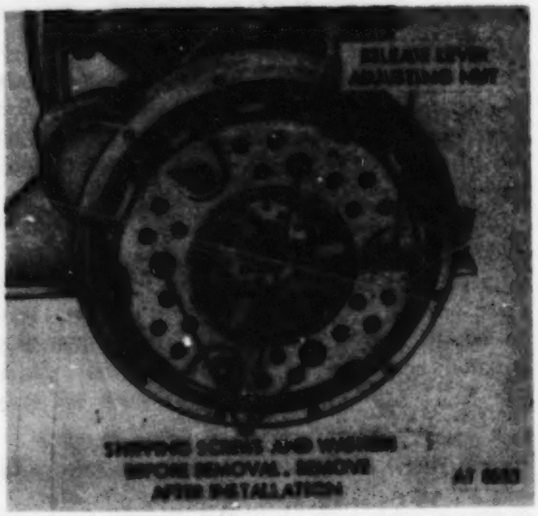

RELEASE LEVER ADJUSTING NUT
SHIPPING SCREWS AND WASHERS BEFORE REMOVAL. REMOVE AFTER INSTALLATION

Figure 8–1. Clutch assembly—installed view.

8–3. Data

Make	**Rockford**
Model	**15 TM**
Type	**Single dry plate**
Size	**15 in.**
Weight	**75 lb**
Torque capacity	**1.550 lb ft**
Number of springs	**21**
Total spring pressure	**4,095 lb**
Number of friction facings	**2**

Section II. REPAIR OF CLUTCH PRESSURE PLATE ASSEMBLY AND CLUTCH DISK

8–4. Disassembly

***Caution:* Before clutch assembly is removed from the flywheel, three ⅜–16 NC x 2–½ capscrews and ⅜ flat washers must be installed in clutch assembly (fig 8–1). Failure to do so will cause all spring pressure to be placed on release levers, with resulting damage to them. Screws must be removed after installation.**

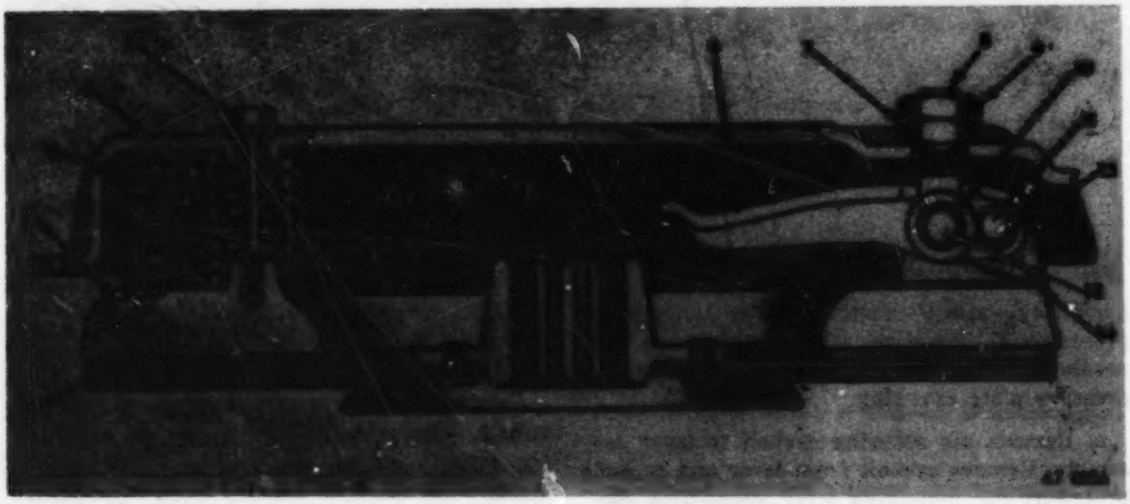
During disassembly, be sure to note the position of all clutch parts. To assure correct assembly, mark both the pressure plate and cover and the pressure plate (4 and 2, fig. 8–2) so that balance is maintained when assembling. Refer to TM 9–837 for balancing instructions when assembling complete unit to flywheel. Refer to figure 8–3 for components and parts location. Refer to paragraph 8–5 for cleaning procedures, paragraph 8–6 for inspection and repair procedures, paragraph 8–8 for repair and rebuild standards for clutch assembly, and paragraph 8–6c. for clutch spring length and tension.

a. Refer to figure 8–4. Scribe an alinement mark on both the pressure plate cover and the pressure plate. Using a suitable steel bar and arbor press, depress pressure plate cover sufficiently to relieve tension on shipping capscrews. Remove three shipping capscrews and plain washers.

b. Refer to figure 8–5. Remove three lock (fig. 8–4) and three adjusting hexagon nuts by alternately turning each nut an equal number of turns to relieve spring tension evenly. Release pressure on arbor press gradually.

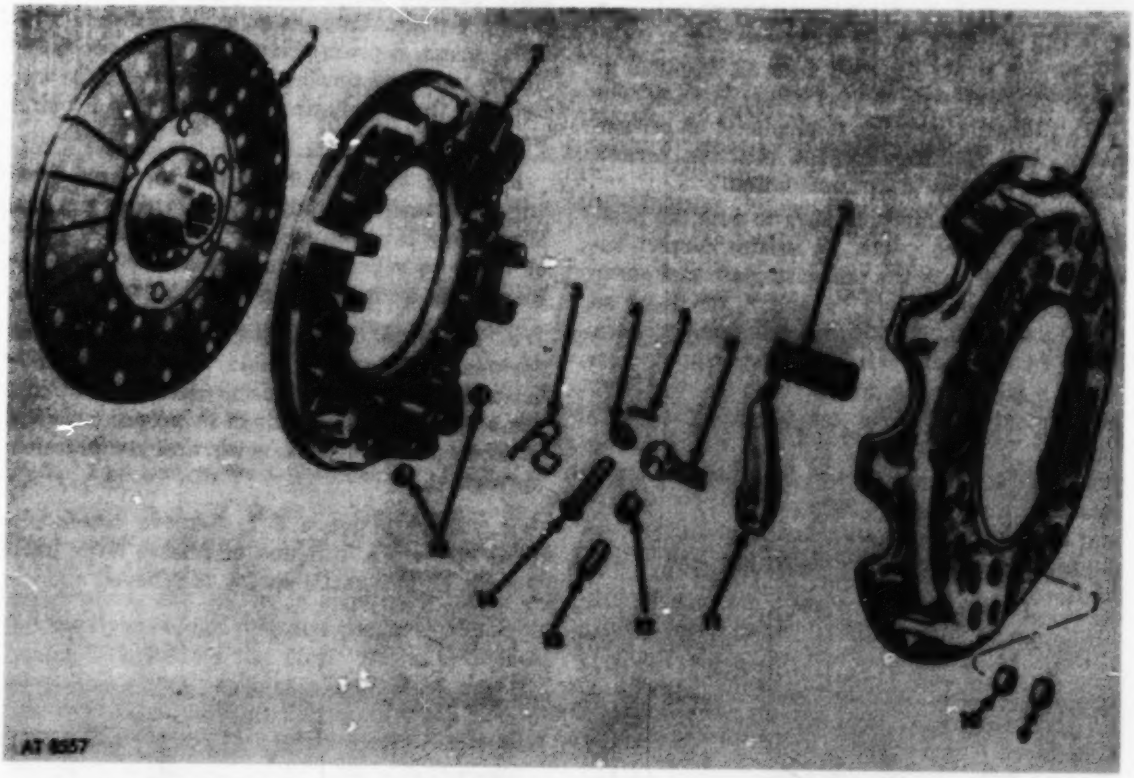
c. Refer to figure 8–6. Before removing springs, make a chalk mark on the bosses not covered with a compression spring to assure the assembly of the springs in proper balance. Remove pressure plate cover and compression springs.

d. Refer to figure 8–7. Remove cotter pin from clevis pin. Lift end of release lever until tension of anti-rattle spring is relieved and re-



1 Disk, driven, with hub and facings
2 Plate, pressure
3 Spring, compression
4 Cover, pressure plate
5 Capscrew and flat washer (shipping usage only)
6 Lever, release
7 Nut, adjusting
8 Bolt, eye
9 Nut, adjusting lock
10 Bearing, needle
11 Pin, clevis
12 Bearing, needle
13 Pin, pivot
14 Spring, anti-rattle

Figure 8–2. Pressure plate assembly with disk—sectional view.



1 Disk, driven, with hub and facings
2 Plate, pressure
3 Spring, anti-rattle
4 Washer, pivot pin
5 Pin, pivot pin cotter
6 Bolt, eye
7 Spring, compression
8 Cover, pressure plate
9 Nut, adjusting lock
10 Nut, lever adjusting
11 Lever, release
12 Bearing, needle
13 Pin, lever pivot
14 Pin, eyebolt
15 Bearing, pressure plate

Figure 8-3. Clutch and pressure plate assembly—exploded view.

move clevis pin. Remove release lever. Repeat procedure for each release lever. Remove six needle roller bearing assemblies from bosses on pressure plate assembly.

e. Remove pin securing eyebolt to lever assembly. Remove eyebolt from lever and repeat procedure for remaining lever assemblies. Remove needle roller bearing assembly from each eyebolt assembly.

8–5. Cleaning

Clean pressure plate assembly thoroughly, using drycleaning solvent or mineral spirits paint thinner. Blow dry with low-pressure compressed air. Clean the disk assembly with compressed air or a clean dry cloth.

Caution: **Never permit drycleaning solvent, mineral spirits paint thinner, grease, or oil of any kind to contact the facings of the clutch-driven disk.**

8–6. Inspection

a. *Clutch Disk Assembly.* Inspect disk for broken disk segments, loose or broken rivets, oil-soaked condition, excessively glazed surface, or if worn too thin to permit proper engage-

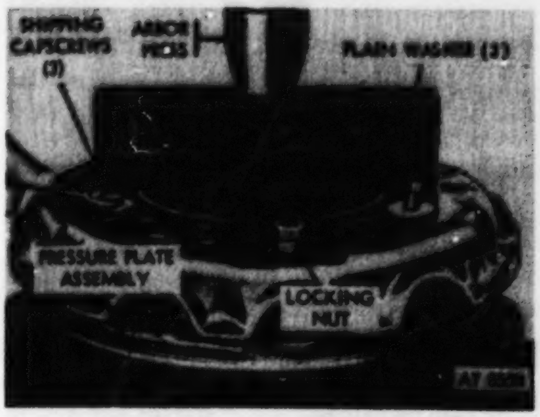

SHIPPING CAPSCREWS (3)
ARBOR PRESS
PLAIN WASHER (3)
PRESSURE PLATE ASSEMBLY
LOCKING NUT

Figure 8-4. Disassembly or assembly of pressure plate assembly, and removal of shipping screws, using arbor press.

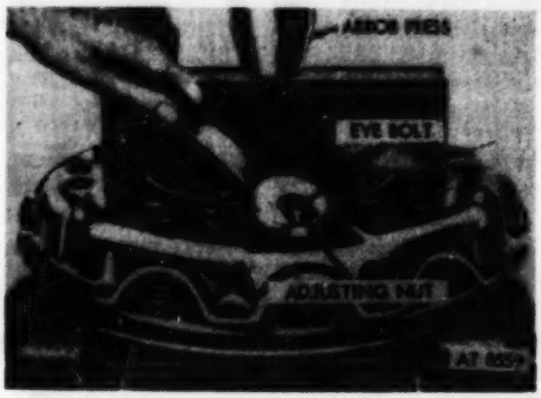

ARBOR PRESS
EYE BOLT
ADJUSTING NUT
AT 8559

Figure 8-5. Disassembly or assembly of pressure plate assembly.

ment. Inspect the splined hub which is fastened to the disk, for loose rivets and worn or burred splines. Replace the disk assembly if any of the above conditions exist or if thickness is less than 0.417 inch.

b. *Release Levers*. Refer to figure 8-7. Inspect for cracked, broken, or warped levers. An excessively worn contact surface on release levers is an indication that the release bearing may not be functioning properly. Check the condition of the eyebolt. Make sure that needle bearings in pressure plate and eyebolt are in serviceable condition, and not worn or missing. Replace pressure plate if any of the above conditions exist.

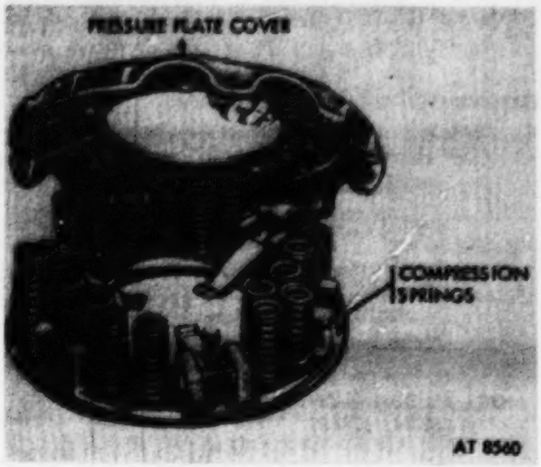

PRESSURE PLATE COVER
COMPRESSION SPRINGS
AT 8560

Figure 8-6. Disassembly or assembly of pressure plate cover and spring.

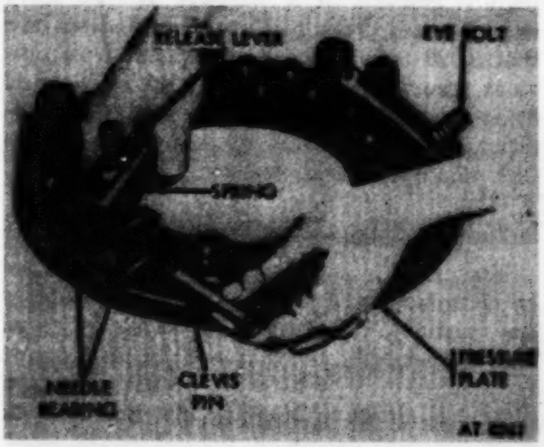

RELEASE LEVER
EYE BOLT
SPRING
PRESSURE PLATE
NEEDLE BEARING
CLEVIS PIN

Figure 8-7. Disassembly or assembly or pressure plate related parts.

c. *Clutch Springs*. Inspect clutch springs for length and for tension (fig. 8-8). The condition of a compression spring can be determined to a large degree by its color. If the paint is burned off, it is likely that the tension of the spring has been changed. Use a spring tester and test springs. If spring tester is not available, compare each spring with a new one to judge free length and tension. Replace all springs that have free length variations.

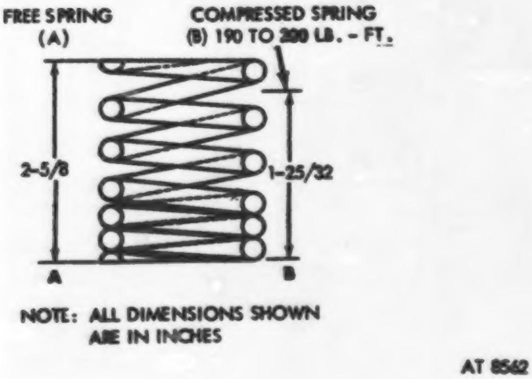


Figure 8–8. Compression spring test.

d. *Clutch Pressure Plate.* Check clutch pressure plate for cracks (other than heat checks) and for warpage (fig. 8–9). Replace pressure plate if cracked, or if warpage exceeds 0.004 inch. Replace pressure place if indications are that 0.020 inch of stock was removed in previous resurfacing operations (par. 8–7), or if defects cannot be eliminated by removal of additional stock without exceeding the 0.020-inch removal limitation.

8–7. Repairing Clutch Pressure Plate

Resurface pressure plate on surface grinder on lathe for removal of grooving and scuffing, and microfinish to 32 rms. If necessary, total maximum stock removal of 0.020 inch below new part size is permissible. Replace pressure plate if specified surface finish is not obtained, or if the heat checks exceed 0.020 inch after resurfacing operation. Stamp depth of stock removal on outside edge of plate to prevent removal of stock beyond 0.020-inch limitation, in the event that a second resurfacing operation must be performed at a later date. Static-balance pressure to within 0.5 inch-ounce.

8–8. Repair and Rebuild Standards for Clutch Assembly

The repair and rebuild standards included in table 12, with points of measurement shown in figure 8–10, give the minimum, maximum, and key clearances of new or rebuilt parts. They also give wear limits which indicate that point to which a part or parts may be worn before replacement is required, in order to receive maximum service with minimum replacement. Minimum, maximum, and wear limits are in inches unless otherwise indicated.

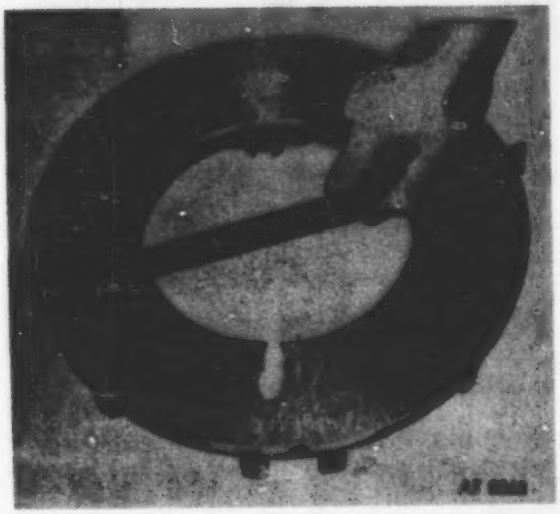


Figure 8–9. Checking clutch pressure plate for warpage.

8–9. Assembly

Assemble the clutch and pressure plate assembly in reverse of disassembly (par. 8–4). Install shipping screws and flat washers.

8–10. Adjustment

a. Refer to figure 8–11. Adjust retaining capscrews uniformly until the face of the pressure plate is exactly 1 9/32 inches from the inner surface of the pressure plate cover flange.

b. Refer to figure 8–12. Lay clutch pressure plate assembly face down on flat surface. Adjust the adjusting nuts uniformly until the top of the release levers are exactly 2 5/32 inches from flat surface the face of the pressure plate is resting on. After adjustment is complete, install and tighten locknuts over adjusting nuts.

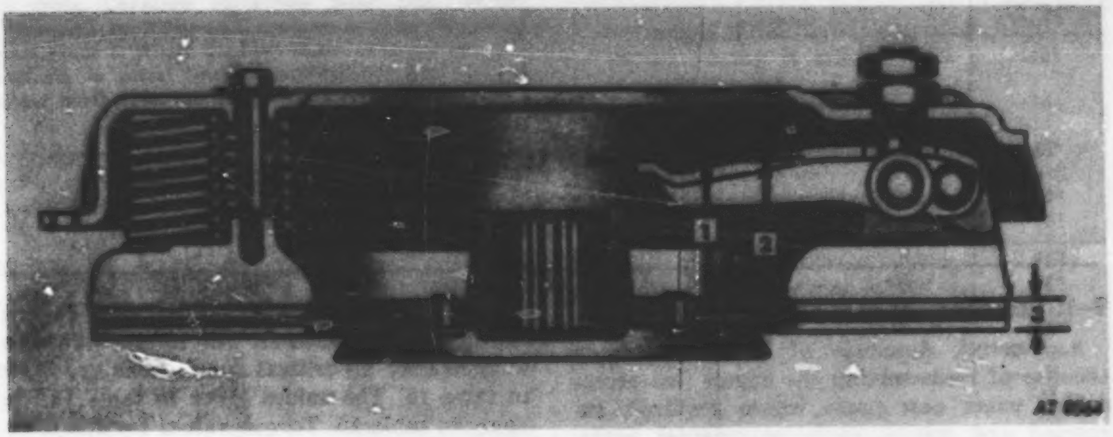


Figure 8–10. Wear-limit points of measurement for clutch assembly.

Table 12. Repair and Rebuild Standards for Clutch Assembly

Ref No.	Point of measurement	Size and fit of new parts	Wear limits	
			Field	Depot
1	Release lever to pressure plate surface	2.261–2.291	*	*
2	Release lever to flywheel surface	2.688–2.812	*	*
3	Thickness of driven disk	0.460–0.482	*	0.417

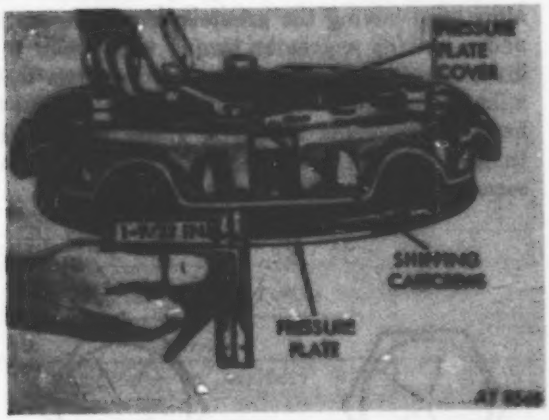

PRESSURE
PLATE
COVER
SHIPPING
PRESSURE
PLATE

Figure 8–11. Clutch pressure plate adjustment.

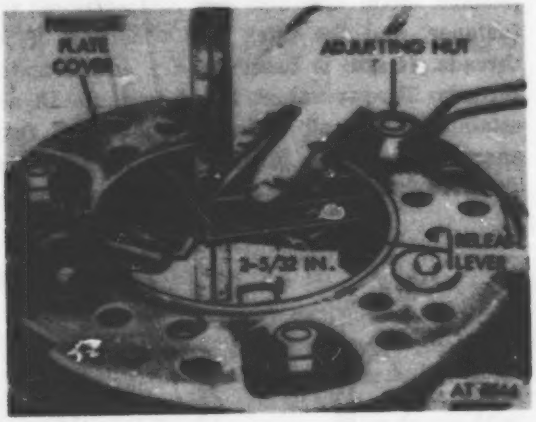


PLATE
COVER
ADJUSTING NUT
2-5/32 IN.
RELEA
LEVER

Figure 8–12. Release lever adjustment.

CHAPTER 9

ASSEMBLY OF ENGINE

9–1. Reassembly and Torque Values

a. *General.* Assembly of the basic engine consists of reassembling the engine less accessories, using new parts where required, inspected and rebuilt parts or original parts, and using proper torque values and clearances (table 13).

Note. All running and mating parts should be suitably lubricated with accepted lubricants (OE–30 or GC–A) to prevent surface distress during initial operation of the engine.

b. *Torque Values and SAE Grades.*

(1) *General torque values.* To properly hold, remain tight and prevent overstretching of a bolt, screw, stud or nut, a predetermined torque value has been established for all threaded fasteners. This torque value is dependent upon the size and material of the fastener, and the pitch and condition of its threads. It also is based on dry or lubricated threads. Torque values listed in table 13 are established for all noncritical threaded fasteners used in the Mack ENDT 673 engine. Table 14 indicates the maximum allowable tolerance for each range of torque values regardless of the size fastener. The torque values established for all critical applications are listed in table 15. The values given in table 14 also apply to table 15. Torque values for the injection pump and governor assembly are indicated in figure 7–26.

Note. Each manufacturer, in the absence of an industry standard, establishes his own torque values based upon tests and research. Valves shown herein may differ from other torque value charts for the same size, class, and material threaded fastener in publications of other manufacturers.

(2) *SAE grades of threaded fasteners.* The materials and method of treatment will determine the tensile strength of the threaded fastener. Capscrews or bolts are classified according to grades established by the SAE, these being SAE grades 2 through 8. Grade 8 is an alloy steel having the greatest tensile strength and requiring a greater torque value than the lower grade numbers. Since all materials look alike, a system of radial lines on the capscrew head will indicate the SAE grade (fig. 9–1). In addition, all internal wrenching hexagon-socket screws are classified as grade 8.

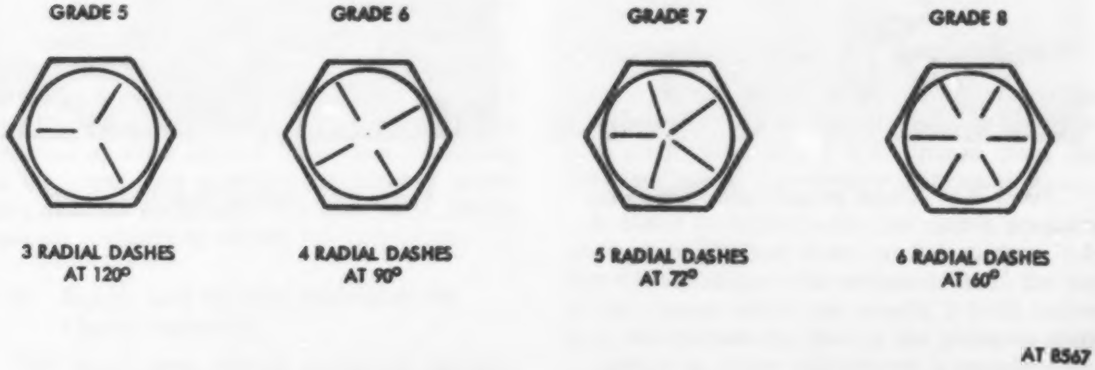


Figure 9–1. SAE screw grade identification symbols.

Note. **Capscrew containing Mack part number 76040-1AX or 76040-4AX conform to requirements of SAE grade 5. Where the head of the capscrew does not conform to radial lines, manufacturers may form a grade number on the head.**

Table 13. Torque Values

Size	SAE Grade-5	SAE Grade 6-7	SAE Grade-
	Lubricated Lb/In.	Lubricated Lb/In.	Lubricated Lb/In.
1/4-20 NC	75	96	108
1/4-28 NF	86	108	120
	Lb/Ft	Lb/Ft	Lb/Ft
5/16-18 NC	13	16	18
5/16-24 NF	14	18	20
3/8-16 NC	23	30	35
3/8-24 NF	25	30	35
7/16-14 NC	35	45	55
7/16-20 NF	40	50	60
1/2-13 NC	55	70	80
1/2-20 NF	65	80	90
9/16-12 NC	80	100	110
9/16-18 NF	90	110	130
5/8-11 NC	110	140	170
5/8-18 NF	130	160	180
3/4-10 NC	200	240	280
3/4-16 NF	220	280	320
7/8-9 NC	300	400	460
7/8-14 NF	320	440	500
1-8 NC	440	600	680
1-12 NF	480	660	740

Explanation of symbols.

NC—National Course Threads
NF—National Fine Threads
Lubricate all mating surfaces with OE-30

Table 14. Tolerance for Torque Specifications

Range		Permissible tolerance	
Lbs/Ft	Lbs/In.	Lbs/Ft	Lbs/In.
8-20	96-240	±1	±12
21-59	250-700	±2	±24
60-159	-------	±5	----
160-239	-------	±10	----
240-300	-------	±15	----.

Table 15. General Torque Specifications

Description	Values In Lbs/Ft
Air compressor to auxiliary drive housing screw.	50
Auxiliary shaft gear screw	35
Camshaft gear screw	35*
Clutch cover to flywheel screw	35
Connecting rod screw	150*
Crankcase drain plug	50-60
Cylinder head stud nut	Note 1.
Cylinder head cover screw or nut	26
Exhaust manifold stud nut or screw	35
Flywheel to crankshaft bolt, nut or screw.	150/175*¢
Flywheel housing to cylinder block screw.	140*
Flywheel housing 2-piece assembly screw.	35
Injection pump drive coupling screw	45*
Injection pump driven gearshaft nut	Note 2. 140*
Injection pump driving gear screw	35*
Injection pump delivery valve holder	85*
Injection nozzle holder stud in head	30*
Injection nozzle holder stud nuts	17*
Mate bearing capscrews	150*
Nozzle bleed-off line retainer screws	17*
Oil pan mounting screws	18
Oil pan sump mounting screws	18
Oil pump cover screws	7
Oil pump drive shaft nut	60
Timing gear cover to cylinder block screw.	26
Valve lifter cover to cylinder block screw.	26N
Valve rocker camshaft bracket screw	55*
Vibration damper to hub mounting screw.	45P*
Vibration damper to crankshaft screw.	275P*
Water outlet manifold to cylinder head screw.	26

Explanation of symbols:

N—Nyloc screw (locking insert)
P—Place bolt
*—An accurately tested torque wrench should be used
¢—Torque to low setting. Increase until cotter pin enters nearest hole.

Note 1.—Refer to paragraph 9-9d.

Note 2.—Nuts with "V" notches in corners, torque to 140 lb ft Nuts without "V" notches, torque to 90 lb ft.

9-2. Cylinder Block

a. Install oil gallery plugs (figs. 6-2 and 6-3) and rear water passage cover (fig. 6-4) using new gaskets coated with Permatex to insure positive sealing. Install any corehole plugs previously removed, using new preformed packings. Coat preformed packings with grease before installing. Install any additional plugs or drain valves which may have been removed.

b. Install new cylinder sleeves if required (par. 6-10c.).

c. Install new camshaft bearings (par. 6-10e.) and auxiliary shaft bearings (par. 6-

[illegible] if required. Install camshaft rear cover using new gasket (fig. 6–3).

d. Install valve tappets in their respective bores (fig. 5–43).

e. Carefully slide camshaft and camshaft timing gear assembly (par. 6–46) into block (par. 5–18a.). Rotate camshaft so timing marks on gear teeth are toward crankshaft bore.

f. Remove main bearing caps and bearing inserts from block. Apply light coat of OE–30 oil to outside of bearing inserts to retain bearings while installing crankshaft. Bearing half with oil hole and groove is installed in the block (fig. 6–8). Second half is installed in respective bearing cap (par. 5–16). Assemble center bearing thrust washers to bearing cap.

Note. Thrust washer pins in center main bearing cap should protrude .060–.070 inch.

g. Using suitable sling (fig. 5–38) or lifting tool, install crankshaft assembly (par. 6–26g.) in block. Timing mark on crankshaft gear must mesh with timing marks on camshaft gear (fig. 5–37). Slide upper halves of center bearing thrust washer into position.

h. Check running clearance on all bearings when installing bearing caps with a strip of plastigage. Assemble bearing caps and thrust washers to their respective journals with the position number toward the camshaft (fig. 5–36). Lubricate bearing capscrew threads and under head with OE–30 oil. Also lubricate the faces and bore of all washers before installing. Torque to 145–155 lb ft. While assembled, check for crankshaft end play. Using heavy screwdriver at center bearing area, pry crankshaft to one end. Measure gap between thrust washer and thrust face of crankshaft, with feeler gage. Pry in opposite direction and check other thrust gap. End play should be .004-.011 inch. Remove bearing caps and check running clearance. Plastigage should indicate .002-.0045-inch clearance. If clearance is greater than .0045 use appropriate undersize bearing inserts.

i. Replace bearing caps, relubricate screws and washers, and retorque to 145–155 lb ft.

Note. Oil pump will have to be installed at this time as its mounting screws also secure the front bearing cap (par. 5–13d.).

j. Rotate camshaft and crankshaft so the timing marks on camshaft gear are toward the auxiliary shaft bore. Carefully insert auxiliary shaft into auxiliary shaft bore. Assemble auxiliary shaft gear to shaft. Timing mark must mesh with timing marks on camshaft gear (fig. 5–37). Secure with four screws and washers torqued to 35 lb ft. Lock wire in figure 8 pattern.

k. Assemble injection pump drive to camshaft timing gear with key (fig. 5–41). Install four screws and washers. Torque to 33–35 lb ft. Lock wire in figure 8 pattern.

l. Assemble air compressor drive coupling to auxiliary shaft (par. 5–19b.). Replace oil tube if removed.

m. Assemble valve lifter covers to cylinder block, using new gaskets. Cover with turbocharger oil return port is the rear cover. Oil capscrew threads with OE–30 and torque to 26 lb ft.

n. Assemble oil filler hole cover plate to the auxiliary shaft housing.

Note. The opening is found on some cylinder blocks and is used in commercial application of the same cylinder block to fill the crankcase.

9–3. Flywheel Housing and Flywheel

a. *Original Housing.*

(1) Assemble flywheel housing to cylinder block using dowel pins for proper positioning. Install eight capscrews and lockwashers. Torque to 135–145 lb ft. Lock wire in figure 8 pattern through capscrews with drilled heads. Capscrews with locking inserts do not require wiring (fig. 5–22).

(2) Mount dial indicator to rear flange of crankshaft to read inside diameter of clutch housing bolting flange runout. Total indicated runout should not exceed .008 inch. With same dial indicator, check flange face runout. It should not exceed .008-inch total indicator reading.

(3) If either reading exceeds .008-inch TIR, the housing must be removed and new oversize dowels installed. Remove housing and grind off dowels flush with rear face of cylinder block. Replace flywheel housing and bolt in place. Using dial indicator, locate housing

so neither reading exceeds .008-inch TIR. Torque bolts and recheck runout.

(4) With runout within tolerance, using dowel holes in housing, drill two 11/16-inch holes in cylinder block, 1 7/16 inches deep. Use oversize dowel pins 76040-1836C154P62 in new oversize dowel holes.

Note. Do not drill dowel holes until runout has been checked.

b. *New Flywheel Housing.*

(1) Assemble to cylinder block (see 3 above).

(2) When flywheel housing has not been previously doweled, drill dowel hole with ⅝ drill an duse standard diameter dowel 76040-31AX119.

c. *Crankshaft Rear Seal.*

(1) Place rear seal guide on flywheel mounting bolts to guide rear seal over crankshaft flange.

(2) Using rear seal driver 11644694, install rear seal in flywheel housing seal recess.

d. *Flywheel.*

(1) Assemble flywheel to crankshaft, making sure locating pin mates with crankshaft flange. Secure with six nuts (fig. 5-21).

(2) Torque nuts to 150 lb/ft. Increase torque until slot in nut alines with cotter pin hole. Do not increase torque above 175 lb/ft. Insert new cotter pin.

(3) Using dial indicator mounted on flywheel housing, check flywheel face and clutch assembly pilot for runout. Maximum runout is .002 inch.

9-4. Piston and Connecting Rod Assemblies

Note. Apply light coating of OE-30 oil to connecting rod bearings when installing. Also apply coating of oil to connecting rod capscrews.

a. Rotate rebuild stand to place engine in side position. Rotate crankshaft until No. 1 connecting rod journal is in dead-bottom position.

b. Using ring compressor, install No. 1 piston and connecting rod assembly through top of block (fig. 9-2). Inspect to insure word "FRONT" on connecting rod and arrow on piston top both face timing gear end of cylinder block.

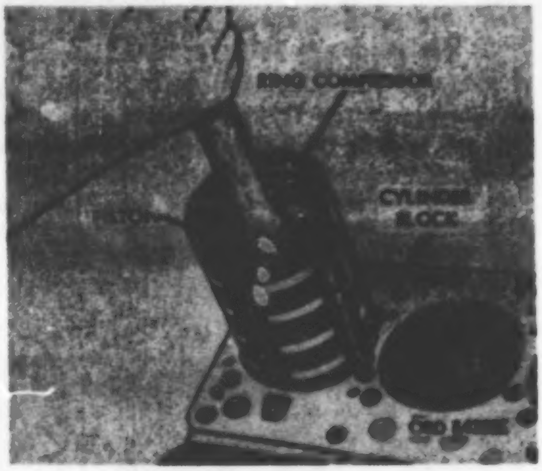


Figure 9-2. Installing piston and rod assembly in cylinder block.

c. Grip connecting rod from crank end and pull into position on crank. Assemble cap to connecting rod fingertight. Insert pair of .007-inch feeler strips between connecting rod front side and crankshaft journal at the cap parting line, to aline cap. Tighten capscrews and check for side clearance of .007-.012 inch.

d. At the same time, connecting rod bearing clearance should be checked using plastigage. Torque connecting rod capscrews to 145-155 lb ft. Clearance should be .0011-.0031 inch.

e. Install No. 6 piston assembly at this time. Rotate crankshaft 120 degrees and install Nos. 2 and 5 piston and repeat for Nos. 3 and 4.

9-5. Injection Pump Drive

a. Install injection pump drive assembly in timing gear compartment (par. 5-19).

b. Rotate camshaft and injection pump drive gear so timing mark on pump drive gear (fig. 5-39) is toward injection pump drive shaft. Mesh pump drive shaft driven gear timing mark and hold gear in place. Assemble pump drive shaft hub to shaft ahead of driven gear. Torque hub nut to 135-145 lb ft.

c. Loosely install four capscrews and lockwashers in driven gear. Final tightening will be made when the injection pump is timed to the engine assembly.

9-6. Timing Gear Cover and Engine Front Mount (fig 9-3)

a. Install new crankshaft seal in timing gear cover (par. 6-93). Install new timing cover gasket. Loosely assemble cover to cylinder block with two capscrews and lockwashers.

Note. Crankshaft end must be free of burrs or nicks to prevent cutting the timing gear seal. Thrust button screws in cover must be retracted fully.

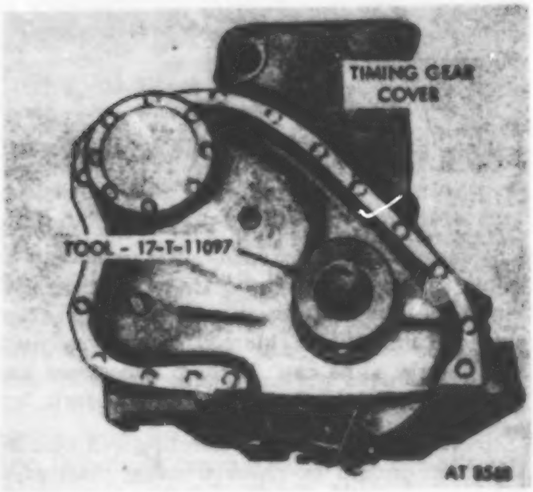


Figure 9-3. Installing timing gear cover.

b. Slide timing gear cover alinement tool 76040-17-T-11097 onto crankshaft, into seal and cover as far as it will go. Shift cover to center if necessary. The bottom edge of the timing gear cover should be flush with oil pan bolting surface.

c. When centered, install remaining capscrews and lockwashers. Install timing indicator. Torque capscrews to 26 lb ft.

d. Remove alinement tool and apply small quantity of grease to the lip of the seal.

e. Turn thrust button screws in until there is no end play, then back thrust button screw out ¼ turn to adjust camshaft and auxiliary shaft end play. Lock thrust button screw lockout.

f. Using new insulator inserts, assemble upper and lower halves of front mount. Use spacer between halves. Secure with two capscrews and lockwashers (Fig. 5-28).

9-7. Oil Pump Pickup Tubes and Relief Valve

Install relief valve using new gasket and oil pickup assembly. Install oil tubes using new gaskets and seals in the reverse order of disassembly (par. 5-13).

9-8. Crankcase Assembly

Install oil pan using a new gasket in reverse order of disassembly (par. 5-12). Torque all capscrews to 18 lb ft.

9-9. Cylinder Heads

a. *Cylinder Block.*

(1) Install cylinder head studs. Make certain that stud bottoms. Use stud driver or two nuts on stud if necessary.

(2) Thoroughly clean top deck of cylinder block.

b. *Cylinder Head Gaskets.*

(1) Inspect gasket for loose grommets or other conditions that may prevent good sealing. Coat the outer edge only, of gasket, to prevent diesel fuel or greases from softening outer edge after installation.

(2) Install gaskets with clean dry faces on front three cylinders. Be sure they aline with dowels in cylinder block. Repeat for rear three cylinders.

Note. The gasket (eighteen 9/16 stud holes) used on engine FSN 2815-980-7092 requires the addition of two small water passage preformed packings that are included loose with the gasket.

c. *Cylinder Head Installation.*

(1) Remove rocker arm shaft assembly if installed (par. 6-40).

(2) Assemble cylinder head to cylinder block insuring dowel pins in cylinder block mate with cylinder heads. Assemble second cylinder head.

(3) Insert rocker arm push rods in cylin-

der block after inspecting for straightness by rolling on flat surface.

(4) Lightly oil stud threads and washer faces. Replace cylinder head nuts. Lifting bracket high, nuts are installed at the left side of No. 1 cylinder and right side of No. 5 cylinder. The taller pair are used on the rear bracket.

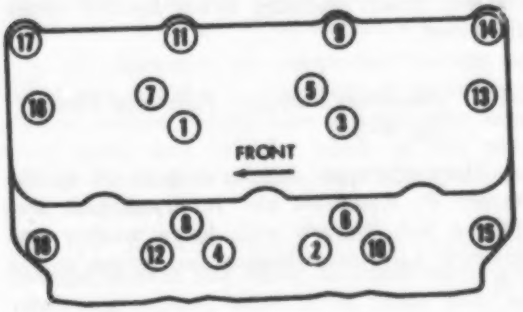
d. *Cylinder Head Stud Nut Tightening Sequence.*

(1) Torque wrench must be accurate.

(2) Depending upon either eighteen stud (fig. 9–4) or twenty stud (fig. 9–5) per cylinder head, the nuts will be tightened in sequence shown, to 50 lb ft.

(3) Repeat sequence, torquing nuts to 100 lb ft.

(4) Again repeat sequence. Final torque for eighteen 9/16-inch stud cylinder head is 150 lb ft. Torque the twenty ⅝-inch stud cylinder head nuts to 150 lb ft and repeat sequence to final 175 lb ft torque.



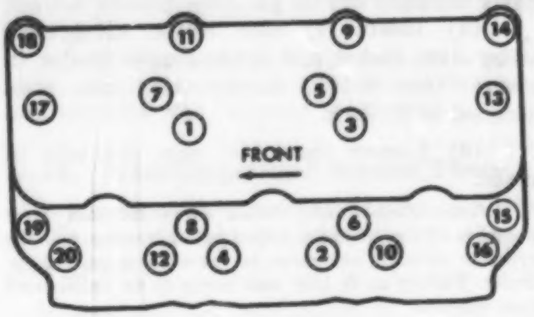
ORD E43403

Figure 9–4. Tightening sequence—cylinder head nuts—(engine FSN 2815–990–7092).

e. *Rocker Arm Assembly.*

(1) Install rocker arm assembly after backing off valve tappet adjusting screws (fig. 5–18).

(2) Torque rocker arm mounting screws to 53–57 lb ft.



AT 8569

Figure 9–5. Tightening sequence—cylinder head nuts—(engines FSN 2815–087–2273 and FSN 2815–045–6865).

(3) Adjust valve clearance cold, inlet valve .016 and exhaust valve .024.

f. *Rocker Arm Cover.*

(1) Clean cover gasket seat. Cement gasket to cover with Cermatex. Do not apply cement to cylinder head face of gasket.

(2) Assemble cover to cylinder head. Install capscrews and gaskets. At rear cover center screw mount crankcase breather control wire bracket. At rear cover rear screw secure oil filler cap anchor bracket with second gasket.

(3) Torque cover screws to 26 lb ft.

g. *Lifting Brackets.* Install front and rear lifting brackets.

h. *Crankcase Breather Assembly.* Assemble crankcase breather tube and valve assembly to both cylinder head covers, using new gaskets (fig. 5–16).

9–10. Injection Pump, Injection Nozzles, and High-Pressure Tubes

a. *Injection Pump.*

(1) Assemble injection pump an dadapter to engine, using new gasket (fig. 5–9).

(2) Inspect to insure that all delivery valve protection caps and fuel port plugs are still in place.

b. *Injection Nozzles.*

(1) Using compressed air, blow injection nozzle sleeve clean.

(2) Insert injection nozzle using new outer dust gasket and inner copper gasket in sleeve (fig. 5-15). Secure with two nuts torqued to 17 lb ft.

(3) Inspect that dust caps are still in place.

Note. Each nozzle should carry the last three numbers of the injection pump serial number and the cylinder number, and must be installed in proper cylinder. Failure to do this may result in an unbalanced fuel system.

c. *High-Pressure Fuel Lines and Overflow Lines*

(1) Replace high-pressure fuel delivery lines (par. 5-5).

(2) Assemble fuel return tubes to injector nozzles, using a gasket between each fitting (fig. 5-13).

(3) Connect center tee of overflow line to injection pump overflow valve.

d. *Injection Pump External Lubrication Hose (fig. 5-17).*

(1) Install elbow in injection pump body directly below the No. 6 delivery valve.

(2) Install elbow in cylinder block right-hand side near the rear water draincock.

(3) Connect hose assembly between cylinder block elbow and the injection pump elbow. Support hose with a clamp at the valve lifter rear cover lower screw, just forward of the turbocharger oil return port (boss).

9-11. Exhaust, Inlet, Water Manifolds, and Thermostat Housing

a. *Exhaust Manifold.*

(1) Assemble three sections of exhaust manifold. Mount exhaust manifold assembly, using new gaskets.

Note. The two center gaskets must have tabs on lower edge. Failure to do this will result in poor support counterbalance for the turbocharger.

(2) Secure with washers and locknuts torqued to 35 lb ft.

b. *Water Manifold.*

(1) Assemble rear section of water manifold to cylinder head, using new gaskets. Install front and rear capscrews and washer. Use shorter of four screws.

(2) Using two long screws and washers, secure flame heater ignition coil plate to middle two screw holes. Insert two short screws and washers in bottom of flanges.

(3) Assemble front section to rear using connector tube and seals. Insert two short screws and washers in bottom of flange.

(4) Install two mounting studs and washers in front water manifold front flange. Assemble intake air heater solenoid mounting plate to second flange, using two long capscrews and washers.

(5) Torque all capscrews and studs to 26 lb ft.

c. *Inlet Manifold.* Assemble inlet manifold to cylinder block, using new gaskets. Install 12 capscrews and washers. Torque to 30 lb ft.

d. *Thermostat and Housing.* Assemble thermostat seal to thermostat. Install thermostat in thermostat housing. Assemble housing to water manifold with two capscrews and washers. Insert radiator brace anchor under capscrews.

9-12. Vibration Damper, Hub and Pulley (fig 5-24)

a. Heat vibration damper hub in oil at 250 degrees F. Assemble key in crankshaft and slide on hub. Secure with large washer and capscrew. Lubricate threads and torque to 275 lb ft.

b. Assemble vibration damper and pulley to hub. Secure with six screws and washers. Torque to 43-47 lb ft.

c. Remove two timing gear cover screws and mount timing indicator. Replace screws and torque to 26 lb ft.

9-13. Water Pump Assembly and Vent

a. Assemble water pump assembly to cylinder block with one long screw and washer at top of pump. Install short screw and washer behind lump into cylinder block.

b. Insert gasket between water pump outlet flange and cylinder block. Secure temporarily with screws. Screws will be removed to mount fuel oil secondary filter.

c. Screw air vent tee into thermostat housing and elbow into top of water pump. Connect with flexible hose assembly.

9–14. Air Compressor and Adapter

a. *Air Compressor Adapter.* Assemble adapter to auxiliary shaft housing, using new gasket.

b. *Air Compressor.*

(1) Assemble air compressor to auxiliary shaft housing and adapter, using a new gasket. Rotate compressor crankshaft to position drive coupling blind spline to auxiliary shaft coupline spline that is blocked with a pin.

(2) Assemble three locknuts and washers. Torque to 50 lb ft.

c. *Coolant Hoses.*

(1) Assemble short coolant inlet hose between cylinder block and front port. Install one elbow in cylinder block between No. 4 and 5 cylinder, and one elbow in air compressor inlet port. No supporting clamps are required.

(2) Assemble air compressor coolant outlet drain and tee to rear port of compressor. Route coolant return hose between the injection pump and cylinder block to the water pump. Connect to water pump with connector and adapter.

(3) Support coolant return hose with clamps. Attach one clamp to front valve lifter cover top screw, third from front end, and one clamp to rear cover top screw, second from end.

d. *Power Steering Pump Adapter.*

(1) Assemble power steering pump adapter to rear of air compressor, using new gasket. Secure with two capscrews and lockwashers.

(2) If engine is to be run-in on test stand, the rear of this adapter must be sealed off to prevent oil leakage from the air compressor during run-in.

Caution: Under no circumstances should an engine equipped with a power steering pump be operated unless the pump is connected to the power steering reservoir, and pumping oil. Operation without pumping oil will score the pump interior.

Note. A flat plate can be installed with a gasket on the rear of the air compressor drive to satisfactorily seal all oil leakage. Use gasket for template.

9–15. Turbocharger and Exhaust Elbow

a. Assemble turbocharger lubrication oil inlet adapter to top of turbocharger, using a new gasket.

b. Assemble the lubricating oil return hose adapter in a similar manner, using a new gasket.

c. Assemble exhaust outlet elbow to turbocharger, using a new gasket.

d. Assemble turbocharger assembly to the exhaust manifold center section, using a new gasket.

e. Assemble turbocharger exhaust pipe adapter to the adapter support. Support must be positioned on the dowel pins in the adapter. Attach support to exhaust manifold, alining it on its locating dowel pins.

f. Clamp exhaust adapter to the turbocharger exhaust outlet elbow.

9–16. Oil Filters, Oil Cooler and Related Lines

a. *Oil Cooler.*

(1) Assemble oil cooler mounting bracket to cylinder block (fig. 5–6). Using new gaskets at both faces of oil cooler, assemble oil cooler and water pump inlet elbow to the water pump (fig. 5–4).

(2) Assemble the oil cooler to the rear support bracket (fig. 5–5).

b. *Water Lines.*

(1) Install an elbow in both the oil cooler rear cover and the water pump. Connect elbows using a compression nut tube assembly (fig. 5–5).

(2) Connect the thermostat bypass housing to the oil cooler front cover, with a molded elbow. Secure with two hose clamps.

c. *Oil Filter Assembly and Pressure Regulator Base (fig. 5-7).* Using new gasket, assemble filter and base assembly to cylinder block. Secure with four capscrews and lockwashers.

d. *Oil Lines (figs. 5-3 and 5-4).*

(1) Connect oil cooler rear or inlet port with pressure regulator base upper port. Use new gaskets at both flanges.

(2) Connect oil cooler front or outlet port with pressure regulator base lower port. Use new gaskets at both flanges.

(3) Install oil pressure sending unit and elbow in the oil cooler outlet tube lower end.

9-17. Turbocharger Oil Lines and Vent Lines

a. *Inlet Oil Line.*

(1) Install elbow in oil filter base rear port. Route turbocharger oil inlet hose between the Nos. 3 and 4 air intake manifold ports. Attach lower end to elbow.

(2) Assemble oil pressure test gage tee to turbo inlet fitting. Side port of tee must be up and plugged.

(3) Assemble oil inlet hose to inlet tee.

(4) Clamp hose in position by the rocker arm cover breather pipe front capscrew, and the No. 3 cylinder intake manifold rear capscrew.

b. *Outlet Oil Line.*

(1) Install street elbow in rear valve lifter cover.

(2) Connect turbocharger oil return hose to turbocharger outlet fitting and street elbow.

c. *Turbocharger Air Vent.*

(1) Install connector in turbocharger. Install elbow in rocker arm cover breather pipe.

(2) Connect turbocharger to breather pipe with tubing and compression nuts.

9-18. Fuel Oil Filter and Lines

a. *Secondary Fuel Oil Filter.*

(1) Assemble filter bracket to cylinder block using the two capscrews that secure the water pump to the cylinder block.

(2) Assemble tee to filter bottom outlet and elbows to side and top outlets. Slide filter into bracket and secure.

b. *Fuel Lines.*

(1) Connect hose between bottom tee and emergency fuel shutoff valve on injection pump.

(2) Connect hose between the No. 1 injector nozzle overflow screw and the filter top elbow.

(3) Connect hose between the rear port of the fuel supply pump and the filter side elbow. Route hose around and behind the injection pump.

9-19. Air Intake Manifold Heater

a. *Fuel Pump.*

(1) Assemble an elbow to forward or inlet port of electric fuel pump, and a connector to the rear or delivery port of the pump.

(2) Mount pump on support bracket and assemble the bracket to the front water manifold studs. Torque stud nuts to 26 lb ft.

b. *Fuel Solenoid Valves.*

(1) Assemble two elbows to each valve.

(2) Assemble both valves to mounting plate. If necessary to remove plate from water manifold capscrews, replace and retorque to 26 lb ft.

c. *Ignition Coil.* Assemble ignition coil to mounting plate mounted on rear section of manifold.

Note. Ignition coil must be insulated by insulator between band clamp and coil.

d. *Nozzle and Spark Plug Assembly.*

(1) Assemble intake manifold heater and nozzle assembly to intake manifold, using a new gasket.

(2) Inspect spark plug for .097-inch gap and install in housing.

e. *Fuel Line Hose Assemblies.*

(1) Connect rear solenoid valve bottom port with nozzle side overflow port.

(2) Connect the rear solenoid valve upper port to the injection nozzle overflow line. The tee for this connection should be between Nos. 1 and 2 injection nozzle.

(3) Connect the front solenoid valve lower port to the fuel pump inlet port.

(4) Connect the fuel pump outlet port to the heater nozzle end port, using an elbow at the nozzle.

Note. Ports in the nozzle should be plugged when removed and remain plugged until hoses are attached, to prevent entry of dirt.

(5) Connect forward solenoid valve upper port to the tee in the secondary fuel oil filter.

f. Ignition Lead. Connect shielded lead between spark plug and ignition coil.

9-20. Generator and Starter

a. *Generator.*

(1) Assemble generator mounting bracket to cylinder block.

(2) Assemble generator to mounting bracket and secure pivot screws and nuts.

(3) Assemble adjustment link to water pump and slotted end to generator.

b. Starter. Assemble starter motor and solenoid to flywheel housing.

9-21. Oil Level Dipstick (fig 5-1)

Attach standoff bracket to cylinder block. Remove dipstick and assemble guide compression nut to the spud on the oil pan rear sump. Attach oil level guide to the standoff bracket and replace dipstick.

9-22. Crankcase Breather Tubes

a. Assemble the two tubes to the breather valves on the rocker arm cover. Run tubing over exhaust muffler and behind injection pump.

b. Assemble deep water fording breather hose assembly to fitting at oil filler spout. Loose end is attached to the turbocharger air intake tubing when the engine is installed in the chassis.

c. The breather valve control link should be wired in the forward position until the engine is installed in the chassis.

9-23. Air Intake Tube

Assemble the air intake tube running between the turbocharber and the intake manifold to the engine. Use short section of hose to couple each end. Use three clamps per hose to stiffen the center section of the hose.

9-24. Fan, Pulley, and Fan Belts

a. Assemble water pump drive pulley and engine cooling fan to the water pump hub.

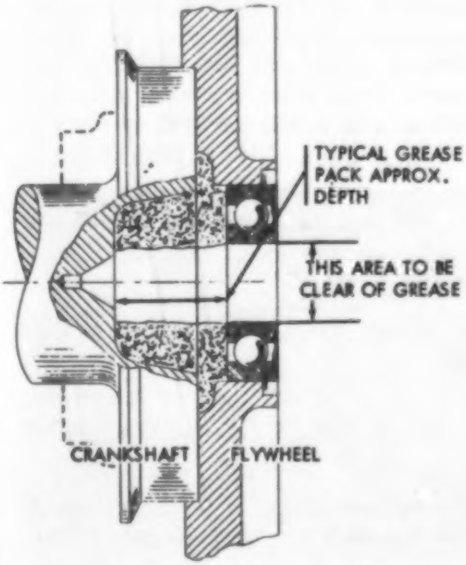
b. Install a matched set of fan belts to drive the water pump and generator.

c. Adjust the tension on the fan belts by loosening the generator link and pulling outward on the generator. Tighten link capscrew.

9-25. Clutch and Clutch Pilot Bearing

a. *Clutch Pilot Bearing (fig. 9-6).*

(1) Pack the bearing with clutch pilot bearing lubricant 76040-243-SX-25, a high-temperature lubricant which will not be thinned out or thrown out by centrifugal forces.


TYPICAL GREASE PACK APPROX. DEPTH
THIS AREA TO BE CLEAR OF GREASE
CRANKSHAFT
FLYWHEEL

AT 8570

Figure 9-6. Clutch pilot bearing cavity properly packed with lubricant.

(2) Install bearing in flywheel bearing bore.

(3) Pack cavity in the flywheel behind the bearing, using the same lubricant except

for the space of the bearing bore to the full depth of the cavity.

Note. Two 2-ounce tubes of 76040-243-SX-25 will be required to pack both the bearing and the cavity.

b. *Clutch Assembly.*

(1) Assemble clutch disk to flywheel, using a splined guide or old transmission pinion shaft to aline disk hub with clutch pilot bearing.

(2) Assemble clutch pressure plate and cover assembly to the flywheel (fig. 5-20).

(3) When clutch assembly is securely fastened, remove the three shipping capscrews. Remove guide.

***Caution:* Failure to remove the shipping screws will prevent operation of the clutch assembly. Unless they are removed now, they may be overlooked when the transmission is assembled to the engine.**

Note. Unless the clutch disk is in position before shipping screws are removed, the transmission pinion shaft will not enter the pilot bearing.

CHAPTER 10

RUN-IN PROCEDURES

10–1. General

a. Every engine that is rebuilt or overhauled using all new parts or a combination of old and new parts must be run-in in a prescribed manner. This insures the proper seating of piston rings, fit of bearings, and other mating parts.

b. A systematic run-in procedure is necessary to provide a guide to all the vital steps and tests required before the engine is released for operation.

c. Engine run-in may be accomplished in one of three ways. The engine can be operated in an engine dynamometer where the necessary load can be applied to the output shaft. It may also be run-in installed in the truck chassis either on a chassis dynamometer or by a prescribed road operation run-in.

d. Before the engine is started the injection pump must be timed to the engine.

Caution: **Do not operate engine with the steering pump mounted unless it is connected to the power steering system. Severe damage will result to the pump if it is run dry.**

10–2. Timing the Injection Pump

a. *General.*

(1) The fuel injection pump must be timed to the engine so as to inject the fuel into the cylinder at the proper moment of the engine compression stroke. Since the injection begins the moment the injection pump plunger covers the fuel sump port, this point must be related to the engine through the timing gears. The Mack ENDT 673 engine is designed for injection to start at 29 degrees before top center (BTC).

(2) Since the possiblity is remote that the timing gears will be reassembled to provide perfect timing of the pump. The pump, therefore, shall be retimed to the engine.

(3) Timing can be accomplished by means of an airflow or fuel-flow test.

Caution: **Air-timing of the injection pump should not be done if the engine will be stored before running. The coating of fuel oil will prevent internal rusting.**

b. *Air Test.*

(1) Thoroughly clean all dirt and foreign materials away from the No. 1 delivery valve holder and line (fig. 10–1). Disconnect high-pressure fuel line and move carefully away from No. 1 delivery valve holder. Plug the end of the high-pressure line with plug FSN 4730–981–2767 (fig. 5–11).

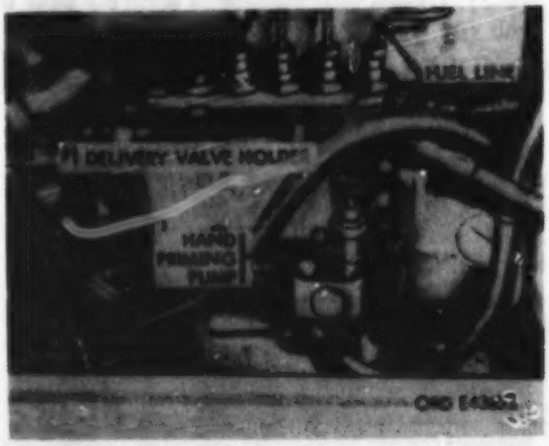


Figure 10–1. Timing injection pump (removing high-pressure fuel line).

Caution: **Do not bend or otherwise distort high-pressure fuel lines as this may cause them to crack.**

(2) Remove No. 1 delivery valve holder

nut and holder. Using delivery valve extractor tool FSN 5120-977-7404, remove delivery valve and spring (fig. 10-2). Replace delivery valve holder and holder nut.

Note. Do not touch lapped surfaces of delivery valve. Carefully lay valve in extra-clean area.

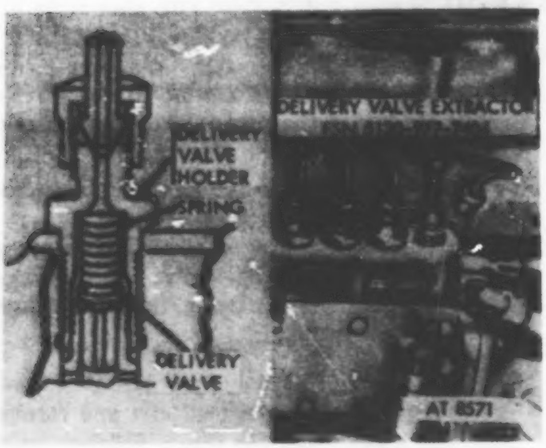


Figure 10-2. Timing injection pump (extracting delivery valve).

(3) Remove eight capscrews and washers securing injection pump timing gear cover (fig. 10-3). Loosen four capscrews securing gear to hub (fig. 10-4).

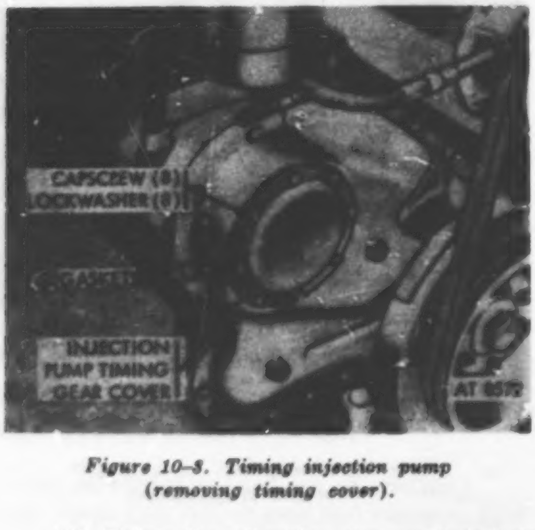


Figure 10-3. Timing injection pump (removing timing cover).

(4) Using the vibration damper hub bolt (fig. 5-32), rotate crankshaft clockwise until

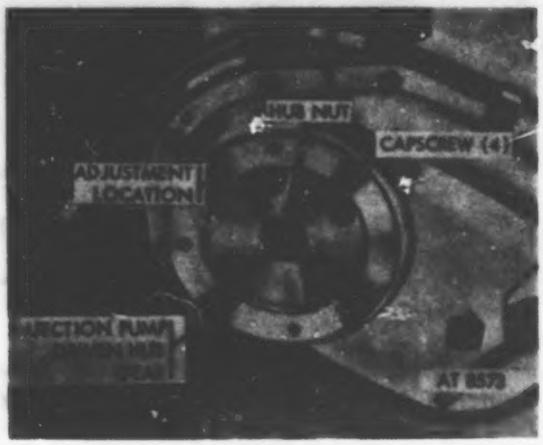


Figure 10-4. Timing injection pump (adjustment location).

the timing indicator approaches 35 degrees before top center (BTC) on the compression stroke.

Note. To determine whether the timing mark is on the compression cycle or the exhaust cycle of the four-cycle engine, insert a 5-inch length of stiff fine wire into the No. 1 delivery valve holder and watch for it to rise. The injection pump camshaft will raise each injector plunger in firing-order sequence as its respective cylinder comes into its compression stroke. If the wire does not rise, rotate the engine one revolution in a clockwise direction, and check wire.

(5) Attach a short section of tubing to the No. 1 delivery valve holder and immerse the end in a jar of clean fuel oil (fig. 10-5). Connection must be airtight.

Note. If a spare injection pump high-pressure delivery line is not available, a special metric thread nut and sleeve is available under part numbers 76040-139GC11 for nut, and 76040-513GC11 for the sleeve and fuel injection tube. Solder a length of .25-inch OD copper tubing to sleeve, and attach with special nut.

(6) Rotate engine until timing indicator on flywheel is exactly 29 degrees BTC. Verify reading on front indicator (fig 5-32). The flywheel being doweled to the crankshaft will give a more accurate reading than the front sheet metal indicator. If the front indicator is off, loosen screws and adjust.

(7) Using a clean dry source of air (such as in a system used for spray painting) with a regulator and moisture trap, apply 4-5 psi of air to the fuel inlet port. Operating lever must be held in full-load position.

(8) Watch jar for stream of air bubbles.

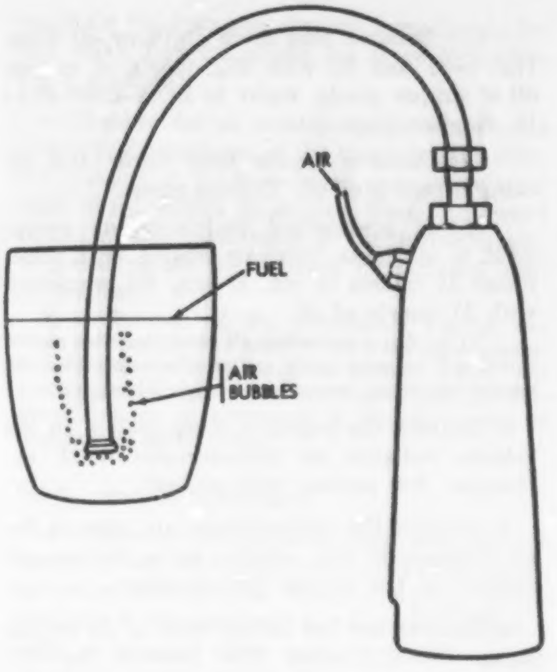


Figure 10–5. Air test.

If the plunger is below the fuel port, air will flow through the injection pump. If the plunger has passed the port, no bubbles will appear. Using a 1 1/8-inch wrench on the injection pump camshaft nut, rotate camshaft until air bubbles flow. Then rotate camshaft clockwise until bubbles cease.

Note. A positive sign of port closing is when a single air bubble just hangs on the end of the tube.

(9) Holding the hub in place, tighten the four capscrews securing the hub to the injection pump drive gear.

(10) Still applying air, rotate engine two revolutions clockwise and observe the airflow. Stop rotating engine when the bubbles cease, and observe the timing pointer. It should indicate 29 degrees BTC. If not, repeat 6 through 9 above.

(11) Remove air supply tube and air discharge tube. Remove delivery valve holder and replace delivery valve and spring. Replace delivery valve holder and nut. Torque to 50 lb ft.

c. ***Fuel-Flow Test*** (*fig. 10–6*).

(1) Prepare injection pump and engine for timing. Refer to b. (1) through (4) above.

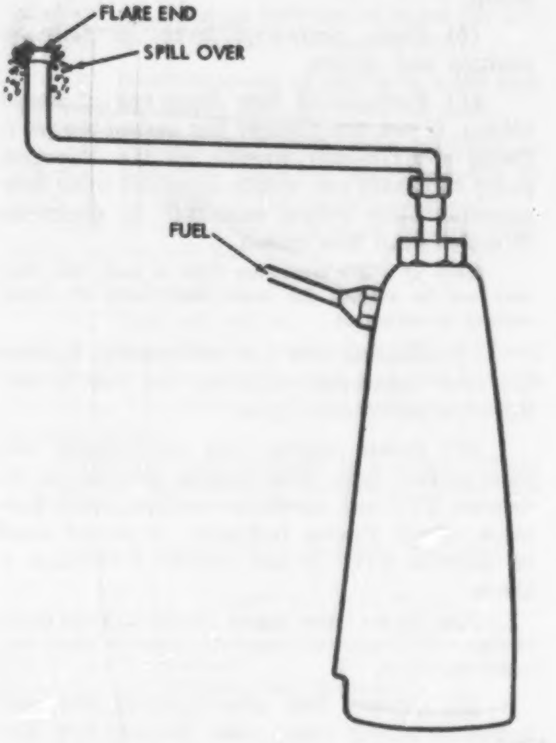


Figure 10–6. Fuel-flow test.

(2) Prepare a similar section of tubing as in b. (5) above, except the upper end should be flared to make it easier to see the fuel flow. The tubing in this test should be positioned outboard of the pump and pointing upward. Wrapping cloths around the tubing will absorb excess fuel oil overflow.

(3) Repeat b. (6) above.

(4) A low-pressure supply of fuel must be supplied to the injection pump fuel sump. Either of two methods may be used:

(a) Remove the secondary filter inlet hose assembly from the side of the filter. Assemble some type of clean reservoir and connecting line approximately 24–30 inches above the injection pump to the secondary fuel filter inlet port. This will act as a reservoir and provide sufficient pressure to time the pump.

(b) If the engine is assembled to a fuel source, the handpriming pump may be used to provide a flow of fuel oil through the injection pump.

(5) Place operating lever in full-load position and secure.

(6) Fuel should flow from end of flared tubing. If not, the plunger has passed the port. Using a 1 1/8-inch wrench on the injection pump camshaft nut, rotate camshaft until flow appears. Then rotate camshaft in clockwise direction until flow ceases.

Note. If a dry secondary filter is used, fuel flow may not be evident for some time until the filter element is saturated.

(7) Holding the hub stationary, tighten the four capscrews securing the hub to the injection pump drive gear.

(8) Rotate engine two revolutions and observe fuel flow. Stop engine rotation at 35 degrees BTC and carefully continue until flow stops. Check timing indicator. It should read 29 degrees BTC. If not, repeat 4 through 7 above.

Note. Do not rotate engine counterclockwise if the 29-degree BTC mark is passed. Continue to rotate two additional turns.

(9) Remove fuel gravity feed line and reconnect supply pump hose. Remove fuel discharge tube assembly and delivery valve holder and nut. Replace delivery valve and spring. Replace delivery valve holder and nut. Torque to 50 lb ft.

d. Replace the injection pump timing gear cover using a new gasket if one was not installed when the timing cover was installed on the engine.

e. Reconnect the No. 1 high-pressure fuel line to the No. 1 delivery valve.

10–3. Engine Run-in Preparation

a. Install engine in engine dynamometer according to manufacturer's instructions, or install engine in chassis for run-in (TM 9–2320–211–20).

b. Lubrication of engine is accomplished as follows:

(1) Remove plug from full-flow oil filter (fig. 1–3) and fill with 2¾ quarts of engine oil of proper grade. Refer to LO 9–2320–211–12. Replace plug.

(2) Remove bypass filter cover and fill using 3 quarts of oil. Replace cover.

(3) If pressurized prelubricating equipment is available, lubricate engine with additional 31 quarts of oil. If not, fill crankcase with 31 quarts of oil.

Note. The lubricating oil used for the engine run-in will be same grade and quality as specified for normal operations according to LO 9–2320–211–12.

c. Connect the engine cooling system to the vehicle radiator or dynamometer heat exchanger. Fill system with coolant.

d. Connect the turbocharger air inlet to the air cleaner on the vehicle, or a similar air cleaner on the engine dynamometer.

e. Connect the fuel supply hose to the supply pump. Use a primary filter between the fuel tank and pump.

f. Remove plug from turbocharger inlet tee and install a 0–100–psi oil pressure gage to observe turbocharger oil pressure.

10–4. Starting Procedure

***Warning:* Do not attempt to start engine until the engine shutoff lever (12, fig 7–12) is connected and operating, and the emergency fuel shutoff valve (fig. 5–8) is installed and operating.**

a. Prime the engine fuel system with the hand-priming pump. Stroke 15 to 20 strokes or until a hard stroke is obtained. Lock knob in position.

b. Crank the engine several revolutions with the engine fuel shutoff lever in the OFF position to insure against mechanical seizure or hudrostatic locks.

***Caution:* Do not operate the starting motor continuously for more than 30 seconds at one time. Wait 60 seconds before recranking engine.**

c. Place fuel shutoff lever in rear position or fully push in engine stop control knob.

d. Depress clutch pedal fully and accelerator pedal half way. Engage starter motor, and release as soon as engine fires. Set throttle to maintain 700 rpm and observe immediately for any leaks, unusual noises, or other indication for a shutdown.

e. Observe the oil pressure gage both on the instrument panel and at the turbocharger inlet. Oil pressure at the instrument panel gage must read 15 psi within 20 seconds. Gage must read 40 psi within 18 seconds at the turbocharger. If pressures are not reached, immediately shut off engine.

Note. Turning off the combination electric and starter-switch key will not stop the Mack diesel engine. This engine is a compression ignition engine and depends solely upon fuel to keep operating. The fuel cutoff, regular or emergency, is the only means of stopping the Mack engine.

10–5. Run-In Procedure

a. *General.* Comparative tests and careful review of engine breakin methods by the manufacturers have proven that a short run under full-load is substantially more effective than a light or no-load slow speed increase type of break-in. Compatibility between critical components (pistons, rings, and bores) is greatly improved by raising engine speed and applying full-load immediately after warmup.

b. *Dynamometer Run-In.*

(1) If chassis dynamometer is available, run-in engine as shown in table 16. Refer to other operating procedures as described by dynamometer manufacturer.

(2) If engine is run-in on engine dynamometer, also use times and loads shown in table 16.

c. *Run-In Without a Dynamometer.*

(1) Start the engine and run approximately fifteen or twenty minutes at 1,000 rpm for warmup. Observe instrument panel for any changes in oil pressure or temperature.

(2) Increase speed of engine to 1,400 rpm and run for thirty minutes with no load.

(3) Operate the vehicle on a highway or other hard-surface road for approximately 50 miles at, or approaching, governed speed.

Note. A tractor should draw an unladen trailer during the break-in run.

d. *After Run-In.*

(1) Shut off engine.

(2) Immediately recheck cylinder head stud nut torque (par. 9–9d.) and check valve clearance. See valve clearance settings on rocker arm cover.

Note. Inlet valve clearance is .016-inch cold and .014-inch hot. Exhaust valve clearance is .024-inch cold and .022-inch hot.

Table 16. Diesel Engine Break-In Procedure

Rebuilt or Overhauled Mack Diesel Engines			
Time	RPM	Load	Elapsed time
¼ hr	1,000	Warmup (No more than ¼ load)	15 min
½ hr	1,400	Full	45 min
½ hr	2,100	Full	1 hr 15 min
¼ hr		Dynamometer power checkout	1 hr 30 min

CHAPTER 11

TESTS

11-1. Cylinder Compression

a. The cylinder compression test is obtained in the Mack engine while it is operating at 1,000 rpm. Compression reading is required to determine if any great variancy appears between cylinders or if they are uniformly normal or low. Normal compression pressure at stabilized 1,000 rpm in a warm engine is 575 psi. An allowance of no more than 50 psi between the highest and lowest reading is permitted.

b. Start the engine and operate at 1,000 rpm for 15 minutes to stabilize the temperature. Stop the engine and quickly proceed to test compression before the engine cools off.

c. Unscrew the connecting overflow line between No. 1 and 2 injector nozzle holder. Remove the center screw from No. 1 nozzle holder, and remove the overflow line to the filter and the loosened end. Using a length of ¼-inch ID hose, slip one end over the disconnected overflow tube and the other into a catchpan.

Note. During the running compression test, some overflow of fuel will be present from all of the operating injector nozzles. Unless a hose is attached to the ends of the remainder nozzle overflows, excessive fuel will run over the clean engine and work area.

d. Disconnect the No. 1 high-pressure fuel line at the nozzle, and cap nozzle inlet port with protective cap FSN 4910-977-7403. Using a length of ½-inch ID hose, slip one end over the high-pressure fuel line and place the other end in a catchpan. Remove the injection nozzle and copper gasket.

e. To test compression, place adapter FSN 4910-977-7402 in nozzle hole, using a new copper gasket FSN 2910-974-7559. Secure adapter in nozzle hole with two hexagon nuts and torque to 17 lb ft. Connect compression gage FSN 4910-870-6283 to the adapter (fig. 11-1). Check that overflow and high-pressure drain hoses are in place. Start engine and run at 1,000 rpm for one to two minutes to stabilize engine oil pressure and temperature before observing the compression reading. After reading has been taken, shut down engine by pulling out the engine shutoff control. Do not shut the engine down by use of the emergency fuel shutoff valve.

Note. The Mack diesel engine is designed to operate on five cylinders and will not be harmed during a two- or three-minute operation.

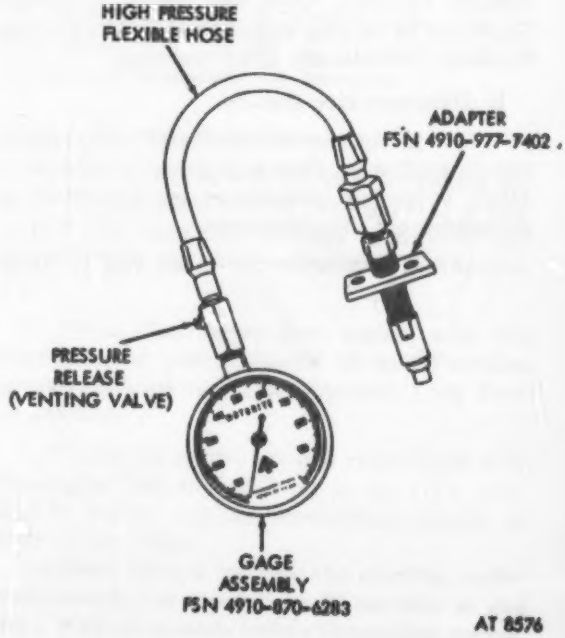


Figure 11-1. Compression gage and adapter.

f. Disconnect the compression gage from the adapter and remove adapter, discarding the used gasket. Replace the injection nozzle holder, using a new gasket and torquing hexagon nuts to 17 lb ft. Remove drain hoses and replace overflow and fuel delivery tubes.

Note. It is advisable to use a new gasket for each compression check and when replacing the injector nozzle. Once a gasket or seal is torqued and removed from its seat it will not seat properly.

g. The remaining five cylinders are checked in the same manner except for cylinders 2, 3, 4, and 5 which require two drain hoses.

11–2. Fuel-Flow Test

a. The injection pump must have a minimum of 12-psi pressure when measured at the injection pump fuel inlet. The injection supply pump is designed to produce sufficient pressures to force the fuel through the secondary filter to the injection pump. A reduced pressure would indicate a clogged or malfunctioning supply pump. A tee and plug are installed at the emergency fuel shutoff valve to provide an access to the fuel line for pressure testing.

Note. Some early-production engines had the pressure test tee and plug installed at the supply pump inlet, directly below the handprimer pump. In this position the tee serves no purpose. Since an accurate determination of secondary filter restriction can only be measured between the secondary filter and the injection pump, this tee should be changed to replace the elbow connecting the filter to the shutoff valve. The elbow should be used directly below the handprimer pump in place of the tee.

b. To test injection pump gallery pressure, remove the plug in fuel shutoff valve tee and install a 0–30-psi gage. The gage should have a restrictive orifice to dampen the supply pump pulsations and provide a more accurate reading.

c. Start engine and operate at full-load speed, observing gage reading. If pressure raises to 12 psi or above and stabilizes, the overflow valve is operating correctly. If pressure in fuel line is below 12 psi but above 6 psi, remove and replace secondary filter. If pressure does not rise to 6 psi with a new filter element, check injection pump overflow valve for stuck-open valve or distorted spring.

11–3. Air Intake Heater

With the engine operating, activate the air intake heater system. Hold hand on the air intake manifold and check for heat. The heater system should operate on a minimum of 10 volts dc.

Caution: Do not operate the heater system without cranking the engine. Before operating the heater, inspect the polarity of the connections. Reverse polarity will burn out the ignition coil.

11–4. Governed Speed

a. The injection pump and governor were tested, calibrated, and the governor set, before the injection pump assembly was installed on the engine. At that time the no-load governor speed was set to 2,280 rpm engine speed, or 1,140 rpm pump speed. This provides proper fuel delivery at 2,100 rpm with full load. When the engine is installed in a vehicle, the idle- and no-load speed must be checked.

b. To insure an accurate test, disconnect the vehicle tachometer and install a calibrated, test tachometer. Disconnect the throttle linkage at the operating lever to insure no binding or restrictions.

c. Start engine and run until it is at operating temperature. Move operating lever to full no-load position, observing tachometer reading of 2,280 rpm. If reading is not at 2,280 rpm, check that the external stops used with the solid operating lever are not touching. If linkage is free and reading is off, remove operating lever adjustment upper cover and adjust full-load stopscrews (fig. 11–2) to obtain 2,280 rpm, and retighten locknuts.

d. Check idle-speed at 650 rpm. If idle-speed is incorrect, adjust idle-speed adjustment screw to obtain the desired idle-speed of 650 rpm.

e. Connect throttle linkage to operating lever and observe idle-and no-load rpms. If previously obtained speeds are disturbed, check accelerator pedal stopbolt or other restrictions.

f. Remove test tachometer, reconnect vehicle tachometer, and observe readings. If readings are incorrect, check tachometer cable and replace if necessary.

g. On solid operating lever injection pumps, the external stopbolts must have 1/8-inch clearance at each end of the lever travel (fig. 11–3).

Note. The external stopbolts are to prevent excessive operating lever pressures from shearing the shaft when it contacts the covered stops.

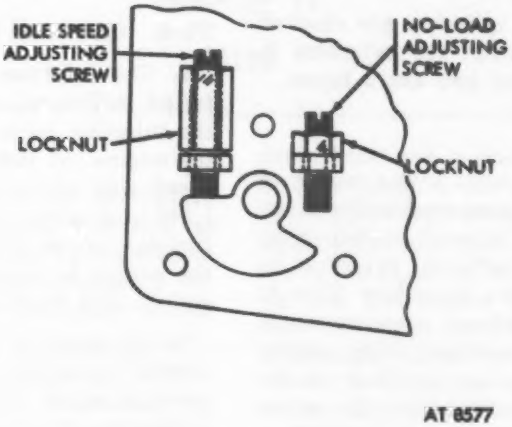

IDLE SPEED ADJUSTING SCREW
LOCKNUT
NO-LOAD ADJUSTING SCREW
LOCKNUT
AT 8577

Figure 11-2. Adjusting maximum governed speed.

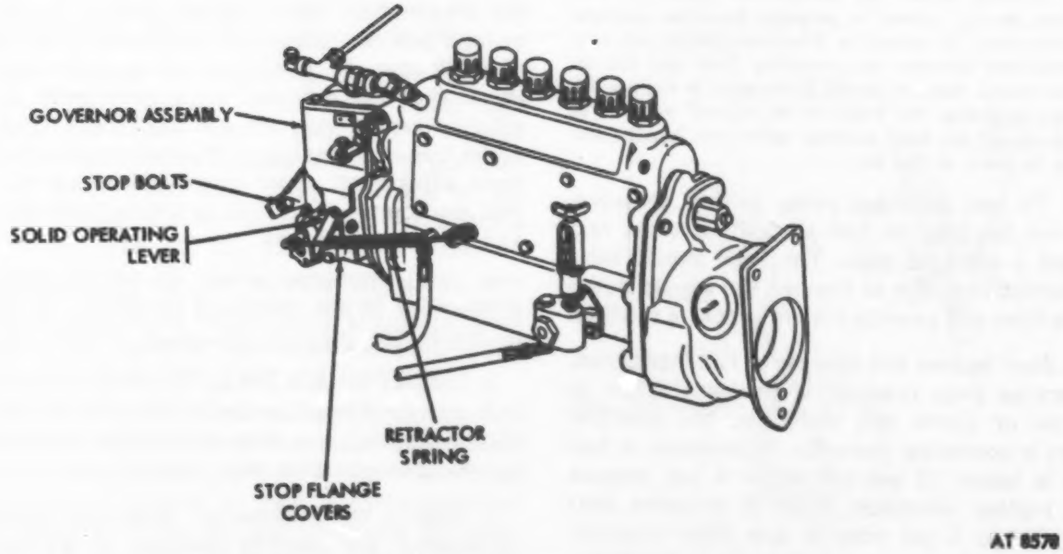

GOVERNOR ASSEMBLY
STOP BOLTS
SOLID OPERATING LEVER
RETRACTOR SPRING
STOP FLANGE COVERS
AT 8578

Figure 11-3. Solid operating lever stops and spring configuration (injection pump model 5036B).

APPENDIX A

REFERENCES

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1. Indexes

The following indexes will be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this technical manual.

Military Publications:

Index of Administrative Publications	DA Pam 310-1
Index of Blank Forms	DA Pam 310-2
Index of Graphic Training Aids and Devices	DA Pam 310-5
Index of Supply Manuals—Ordnance Corps	DA Pam 310-29
Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders	DA Pam 310-4
Index of Training Publications	DA Pam 310-3

2. Forms

DA Form 2028, Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8, or 9, is used to report publication errors or omissions. For use of maintenance forms, refer to TM 38-750, 8he Army Equipment Record Systems and Procedures.

APPENDIX B

DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

1. Scope

This appendix is a list of repair parts, special tools, and test and support equipment required for the performance of Direct Support, General Support and Depot Maintenance of the Mack Diesel Engine, ENDT 673.

2. General

This repair parts and special tools list appendix is divided into the following sections:

a. *Introduction—Section I.*

b. *Repair Parts List—Section II.* A list of repair parts authorized for the performance of maintenance at the direct support, general support, and depot level.

c. *Special Tools, Test and Support Equipment List—Section III.* A list of special tools, test and support equipment authorized for the performance of maintenance at the direct support, general support, and depot level.

d. *Federal Stock Number Index—Section IV.* An index to illustration figure and item number.

e. *Part Number Index—Section V.* An index to illustration figure and item number.

3. Explanation of Columns

The following provides an explanation of columns in the tabular lists in sections II, III, and IV.

a. Source, Maintenance, and Recoverability Codes, column 1, is as follows:

(1) Source Code, column 1a, indicates the selection status and source for the listed item. Source codes used are:

Code	*Explanation*
A	Applied to assemblies which are not procured or stocked as such but are made up of two or more units, each of which carry individual stock numbers and descriptions, and are procured and stocked and can be assembled by units at indicated maintenance categories.
C	Applied to repair parts authorized for local procurement. If not obtainable from local procurement, such repair parts will be requisitioned through normal supply channels with a supporting statement of nonavailability from local procurement.
G	Applied to major assemblies which are procured with PEMA funds for initial issue only and are used as exchange assemblies at direct and general support maintenance level. These assemblies will not be stocked above direct support maintenance or general support maintenance level, or returned to depot supply level.
M	Applied to repair parts which are not procured or stocked as separate supply items but are to be manufactured at the indicated maintenance levels.
P	Applied to repair parts which are stocked in or supplied from the GSA/ASA or Army military supply system and authorized for use at indicated maintenance categories.
X1	Applied to parts and assemblies which are not procured or stocked, the mortality rate of which is normally below that of the applicable end item, and the failure of which would result in retirement of the end item from the supply system.
	Applied to repair parts which are not procured or stocked, the requirement for which will be supplied by use of the next higher assembly or component.
XZ	Applied to repair parts which are not procured or stocked. The indicated maintenance category requiring such repair

Code	*Explanation*
	parts will attempt to obtain through cannibalization. If not obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.

The letter "K" reflected in columns 7 and 8 is used to indicate the applicable categories of maintenance and is only for reference purposes.

(2) Maintenance Code, column 1b, indicates the lowest category of maintenance authorized to install the listed item. The maintenance level codes are:

Code	*Explanation*
O	Indicates organization maintenance level, providing local end item repair and return to service or on-site repair service.
F	Indicates direct support maintenance level, providing either local mobile or direct service unit fixed shop repair and return to user service.
H	Indicates general support maintenance level, providing mobile or fixed shop repair and return to user or supply stock service.
D	Indicates depot maintenance level, providing fixed shop repair, major facilities, and return to supply stock service.

(3) Recoverability Code, column 1c, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

Code	*Explanation*
R	Applied to repair parts and assemblies which are repaired at direct and general support maintenance levels. These repair parts which are not economically repairable at depot level, will be recovered at the direct and general support maintenance levels and will be replaced from supply on an exchange basis.
T	Items are authorized to be repaired within the limitations of the maintenance allocation chart for each designated category of maintenance. Unserviceable economically repairable assemblies which cannot be repaired with the time, tools and skills available will be shipped to the next higher category of maintenance for repair or overhaul.
U	Applied to repair parts specifically selected for salvage because of precious metal content, critial materials; high-dollar value, reusable casing or casting material, etc. These repair parts will be recovered at the maintenance level prescribed by the commodity command.

b. Federal Stock Number, column 2, indicates the Federal stock number for the item.

c. Description, column 3, indicates the Federal item name and brief description of the item. The abbreviation "w/e" when used as a part of the nomenclature, indicates the Federal stock number includes all armament, equipment, accessories, and repair parts issued with the item. A five-digit manufacturer's or other service's code and part number are included in parentheses for reference. Repair parts quantities included in kits, sets, and assemblies are shown in front of the repair part name.

d. Unit of Issue, column 4, indicates the unit, used as a basis of issue, e.g., ea, pr, ft, yd, etc.

e. Quantity Incorporated in Unit Pack, column 5, indicates the actual quantity contained in the unit pack.

f. Quantity Incorporated in Unit, column 6, indicates the quantity of repair parts in an assembly.

g. 30-DAY DS/GS Maintenance Allowances, columns 7, and 8 are as follows:

(1) The allowance columns are divided into three subcolumns. Indicated in each subcolumn, opposite the first appearance of each item, is the total quantity of items authorized for the number of equipments supported. Subsequent appearances of the same item will have no entry in the allowance column, but have a reference in the description column, to the first appearance of the item. Items authorized for use as required but not for initial stockage are identified with an asterisk in the allowance column.

(2) The quantitative allowances for DG/GS levels of maintenance will represent initial stockage for a 30-day period for the number of equipments supported.

h. 1-Year Allowances Per 100 Equipments/Contingency Planning Purposes, column 9, indicates opposite the first appearance of each item the total quantity required for distribution and contingency planning purposes. The range of items indicates total quantities of all authorized items required to provide for adequate support of 100 equipments for one year.

i. Depot Maintenance Allowance Per 100

Equipments, column 10, indicates opposite the first appearance of each item, the total quantity authorized for depot maintenance of 100 equipments. Subsequent appearances of the same item will have no entry in this column, but have a reference in the description column, to the first appearance of the item. Items authorized for use but not for initial stockage are identified with an asterisk in the allowance column.

j. Illustration, column 11, is divided as follows:

(1) Figure Number, column 11a, indicates the figure number of the illustration in which the item is shown.

(2) Item or Symbol Number, column 11b, indicates the callout number used to reference the item in the illustration.

4. Special Information

The following publications pertain to Mack Diesel Engine ENDT 673, and their components:

TM 9-2920-201-45 ...Turborcharger, Engine Assembly (Schwitzer)
TM 9-2920-209-35 ....Generator, Engine Accessory Assembly (Auto-Lite)
TM 9-2920-214-35 ....Generator, Engine Accessory Assembly (Delco-Remy)
TM 9-2920-247-34 ....Generator, Engine Accessory (Prestolite)
TM 9-2920-242-35 ....Starter, Engine Electrical Assembly (Delco-Remy)
TM 9-2920-243-35 ..Starter, Engine Electrical Assembly (Leece-Neville)
TM 9-2920-248-34 ....Starter, Engine Electrical Assembly (Prestolite)

5. How to Locate Repair Parts

a. *When Federal stock number or part number is unknown:*

(1) *First.* Using the table of contents determine the functional group or subgroup, i.e., engine, engine assembly, transmission assembly, within which the repair part belongs. This is necessary because separate illustrations are prepared for functional groups or subgroups, and listings are divided into functional groups.

(2) *Second.* Find the repair part illustration in the back of the publication covering the functional group or subgroup to which the repair part belongs.

Note. Do not bypass this part of the procedure. Positive identification of the repair parts is required.

(3) *Third.* Identify the repair part on the illustration and note the illustration figure and item number of the repair part.

(4) *Fourth.* Using the repair parts listing, find the functional group or subgroup of the repair part and the illustration figure and item number as noted on the illustration.

b. *When Federal stock number or part number is known:*

(1) *First.* Using either the Index of Federal Stock Numbers or Index of Part Numbers to illustration figure and item number, find the FSN or Part Number. Either index is in numerical sequence cross-referenced to illustrate figure and item number.

(2) *Second.* Using the repair part listing, find the functional group or subgroup of the repair part and the illustration figure and item number as noted in the Index of Federal Stock Numbers or Index of Part Numbers.

6. Abbreviations and Symbols

a. *Abbreviations.*

Abbreviation	*Explanation*
adj	adjust(able)(ing)
alloy-s	alloy steel
amp	ampere(s)
amp-hr	ampere hour(s)
anld	annealed
approx	approximate(ly)
assy	assembly(ies)
blunt-pt	blunt point
br	brass
cand-bay-base	candelabra bayonet base
cap.	capacity
cd-pltd	cadmium plated
cd- or zn-pltd	cadmium- or zinc-plated
cham	chamfer(ed)
Ci	cast iron
csk	countersunk
c/l	centerline
cop.	copper
cross-recess-fil hd	cross-recess fillister head
cross recess oval hd	cross-recess oval head
cross recess pan-hd	cross-recess pan head
dble	double

Abbreviation	*Explanation*
dble-fil	double filament
deg	degree(s)
dia	diameter
dld	drilled
dld-f/c-pin	drilled for cotter pin
dld-sq-hd	drilled square head
ea	each
ext-strong	extra strong
ext t	external teeth (lockwasher)
fig	figure(s)
fl	flat
ft	foot (feet)
gimlet-pt	gimlet point
glvd	galvanized
h	height, high
hd	head
hdls	headless
hex	hexagon(al)
hex hd	hexagon head
hex socket	hexagon socket
hv duty	heavy duty
hyd	hydraulic
id	inside diameter
in.	inch(es)
ins	insulated, insulating, insulator
int-ext-t	internal-external teeth
int-t	internal teeth
lb	pound(s)
lg	length (long)
lh	left hand
lht	left-hand thread
lt	light (weight)
lub	lubricating, lubrication
max	maximum
med	medium
med-carb-s	medium steel
MI	malleable iron
min	miniature, minimum, minute
min-bay-base	miniature bayonet base
mm	millimeter(s)
mtg	mounting(s)
mtl	metal
NC	American National Coarse Thread
NF	American National Fine Thread
No.	number(s)
nom	nominal
non-rvrs	nonreversible
NPT	American Standard Taper Pipe Threads
NPTF	American Standard Taper Pipe Threads (Dry seal)
NS	American National Special Thread
od	olive drab, outside diameter (dimension)
opng	opening
oval hd	oval head
oz	ounces
pan-hd	panhead
psi	pounds per square inch
rd end	round end
hd-hd	roundhead
rtc	ratchet
S	steel
sec	section(s)
sgle end	single end
shk	shank
sh-mtl-thd	sheet metal thread(s)
sltd	slotted
sltd hd	slotted head
sp gr	specific gravity
sq	square
sq-drive	square drive
sq-end	square end
sq-hd	square head
sq-socket	square socket
stght	straight
syn-ru	synthetic rubber
temp	temperature
thd	thread(ed)(s)
thk	thick(ness)
tnd-cop	tinned copper
tubr	tubular
UNC	Unified Coarse Thread
UNF	Unified Fine Thread
v	volt(s)
w	wide, width, watt(s)
w/	with
without	without
wtrprf	waterproof
x	by (as in 2 x 4)

b. *Symbols.*

Symbols	*Explanation*
≠	As required
**	Part of or included in kit or set identified by FSN or P/N. See FSN index page—or P/N index starting page

7. Federal Supply Codes

Federal Supply Codes	*Manufacturers*
25140	Globe Hoist Co., Philadelphia, Pa.
31007	International Harvester
51663	Lear Siegler, Inc., Power Equipment Div., Elyria, Ohio 44036
62983	Vickers, Inc.
71724	Crane Packing Co. Morton Grove, Ill.
76040	Mack Truck, Diesel Engine Div.
77820	Scintilla-Magneto Div. of Bendix Aviation Corp.
77873	Rockford Clutch Division of Borg-Warner Corp.
79136	Waldes Kohinoor, Inc., Long Island City, N.Y.
88044	Aeronautical Standards Group, Depts. of the Navy and the Air Force
96906	Military Standard

SECTION II

REPAIR PARTS FOR DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT MAINTENANCE

(1) Source, Maint. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				GROUP 01—ENGINE													
				0100—ENGINE ASSEMBLY													
P	T		2815–974–7407	ENGINE, DIESEL: w/container (5703067)	ea	--	1	--	--	--	1	2	2	10	10	B–5	1
				Consists of:													
X2	F		8115–973–2285	1 CONTAINER: (76040–882GBA51)	--	--	--	K	K	K	K	K	K	--	--	B–5	1.2
X2	F		2815–980–7092	1 ENGINE: (76040–11GBA12006P1)	--	--	--	K	K	K	K	K	K	--	--	B–5	1.1
P	T		2815–087–5076	ENGINE, DIESEL: w/container (5702848)	ea	--	1	--	--	--	1	2	2	10	10	B–5	1
				Consists of:													
X2	F		8115–973–2285	1 CONTAINER: (76040–882GBA51)	--	--	--	K	K	K	K	K	K	--	--	B–5	1.2
X2	F		2815–087–2273	1 ENGINE: (76040–11GBA12006AP1)	--	--	--	K	K	K	K	K	K	--	--	B–5	1.1
P	T		2815–781–7871	ENGINE, DIESEL: w/container (5704120)	ea	--	1	--	--	--	1	2	2	10	10	B–5	1
				Consists of:													
X2	F		8115–973–2285	1 CONTAINER: (76040–882GBA51)	--	--	--	K	K	K	K	K	K	--	--	B–5	1.2
X2	F		-------------	1 ENGINE w/clutch (76040–11GBA12006BP1)	--	--	--	K	K	K	K	K	K	--	--	B–5	1.1
P	H		2815–890–2362	GASKET SET: engine overhaul (76040–590GBA246A).	ea	--	1	--	--	--	2	2	3	10	100	B–6	--
				Consists of:													
P	H		2815–974–7536	GASKET: camshaft, rear brg cover (76040–538GB11).	ea	--	1	--	--	--	•	•	•	--	--	B–6	2
P	F		2815–104–4394	GASKET: air compressor adapter to cyl (76040–541GB18).	ea	--	1	•	•	•	•	•	•	--	--	B–6	14
P	F		5330–974–7537	GASKET: air compressor mounting (76040–541GB13).	ea	--	1	•	•	•	•	•	•	--	--	B–6	44
P	O		2815–974–7561	GASKET: crankcase breather (76040–590GB1176).	ea	--	2	•	•	•	•	•	•	--	--	B–6	35
P	O		2815–974–7551	GASKET: exhaust manifold center (76040–573GB–144).	ea	--	2	•	•	•	•	•	•	--	--	B–6	31
P	O		2815–974–7542	GASKET: exhaust manifold ends (76040–560GB12A).	ea	--	4	•	•	•	•	•	•	--	--	B–6	30
P	O		2815–974–7550	GASKET: intake manifold (76040–573GB135).	ea	--	6	•	•	•	•	•	•	--	--	B–6	42
P	H		2910–974–7567	GASKET: injection pump adapter to block (76040–590GB190B).	ea	--	1	--	--	--	•	•	•	--	--	B–6	13

P	F		2815-974-7568	GASKET: injection pump timing cover (76040-590GB236).	ea	--	1	•	•	•	•	•	•	--	--	B-6	38
P	F		2815-974-7569	GASKET: injection pump to adapter (76040-562GB14).	ea	--	1	•	•	•	•	•	•	--	--	B-6	49
P	O		2990-974-7565	GASKET: manifold heater housing (76040-590GB1209).	ea	--	1		•	•	•	•	•	--	--	B-6	40
P	O		2910-974-7559	GASKET: nozzle holder, inner (76040-590GB1127).	ea	--	6	•	•	•	•	•	•	--	--	B-6	34
P	F		2815-974-7555	GASKET: crankcase (76040-579GB317)	ea	--	1	•	•	•	•	•	•	--	--	B-6	5
P	O		2910-974-7560	GASKET: nozzle holder, outer (76040-590GB1143) (for engines FSN 2815-980-7092 and FSN 2815-087-2273).	ea	--	6	•	•	•	•	•	•	--	--	B-6	39
P	F		2990-974-7548	GASKET: oil cooler inlet and outlet tube flanges (76040-56AX357).	ea	--	2	•	•	•	•	•	•	--	--	B-6	27
X1	H		....	2 GASKET: oil cooler cover and housing (76040-549GB114A).	--	--	--	--	--	--	K	K	K	--	--	B-6	33
X1	H		....	1 GASKET: oil filler hole cover (76040-56AX262).	--	--	--	--	--	--	K	K	K	--	--	B-6	9
X1	H		....	1 GASKET: oil filter base, inlet tube (76040-590GB1245).	--	--	--	--	--	--	K	K	K	--	--	B-6	47
P	O'		....	GASKET: nozzle holder outer (76040-449GC120) (for engine FSN 2815-045-6865).	ea	--	6	•	•	•	•	•	•	--	--	B-6	39
X1	H		....	3 GASKET: oil filter base, outlet tube (1) scavenger pump inlet and outer tubes (2) (76040-590GB1246).	--	--	--	--	--	--	K	K	K	--	--	B-6	27
X1	F		....	1 GASKET: oil pressure relief valve (76040-590GB1122A).	--	--	--	K	K	K	K	K	K	--	--	B-6	22
P	F		2815-890-2352	GASKET: oil pump inlet tube and outlet tube (76040-590GB1210).	ea	--	2	•	•	•	•	•	•	--	--	B-6	8
X1	H		....	1 GASKET: oil pump pickup screen (76040-590GB245).	--	--	--	--	--	--	K	K	K	--	--	B-6	10
P	O		2815-974-7557	GASKET: oil relief valve housing (76040-590GB1109B).	ea	--	1	•	•	•	•	•	•	--	--	B-6	7
P	O		2815-890-2350	1 GASKET: rear sump outlet tube (76040-590GB-1234).	ea	--	1	•	•	•	•	•	•	--	--	B-6	17
P	O		....	GASKET: oil relief valve housing (76040-590GB1266).	ea	--	1	•	•	•	•	•	•	--	--	B-6	7
P	F		2815-974-7541	GASKET: rocker arm cover (76040-554GB38).	ea	--	2	•	•	•	•	•	•	--	--	B-6	1
P	F		2530-974-7564	GASKET: steering pump adapter to compressor (76040-590GB1222).	ea	--	1	•	•	•	•	•	•	--	--	B-6	16
P	F		2530-974-7563	GASKET: steering pump to adapter (76040-590GB1205).	ea	--	1	•	•	•	•	•	•	--	--	B-6	12

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(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0100—ENGINE ASSEMBLY—Continued													
P	F		2920-733-0779	GASKET: tachometer drive housing (76040-598GB11A).	ea	--	1	•	•	•	•	•	•	--	--	B-6	32
X1	O		....	1 GASKET: thermostat housing (76040-590GB1134).	--	--	--	K	K	K	K	K	K	--	--	B-6	4
P	F		2815-974-7539	GASKET: timing gear cover (76040-548GB41A).	ea	--	1	•	•	•	•	•	•	--	--	B-6	48
X1	F		....	1 GASKET: turbocharger exhaust elbow (76040-590GB1167A).	--	--	--	K	K	K	K	K	K	--	--	B-6	11
P	F		2990-974-7548	GASKET: turbocharger, oil drain (76040-56AX357).	ea	--	1	•	•	•	•	•	•	--	--	B-6	18
P	F		2990-974-7547	GASKET: turbocharger, oil inlet (76040-56AX356).	ea	--	1	•	•	•	•	•	•	--	--	B-6	25
P	O		2530-974-7562	GASKET: turbocharger to exhaust manifold (76040-590GB1189).	ea	--	1	•	•	•	•	•	•	--	--	B-6	6
P	O		2815-974-7571	GASKET: valve lifter cover (76040-601GB31A).	ea	--	2	•	•	•	•	•	•	--	--	B-6	29
P	O		2930-974-7549	GASKET: water inlet elbow (1), water pump inlet housing (1) (76040-56AX392).	ea	--	1	•	•	•	•	•	•	--	--	B-6	36
P	O		2930-974-7572	GASKET: water outlet manifold (76040-605GB11B).	ea	--	4	•	•	•	•	•	•	--	--	B-6	46
X1	F		....	1 GASKET: water pump cover (76040-610GB216).	--	--	--	K	K	K	K	K	K	--	--	B-6	2
P	O		5330-974-7543	GASKET: water pump mounting (1) water passage, rear cover (1) (76040-56AX107).	ea	--	2	•	•	•	•	•	•	--	--	B-6	3
P	O		2815-974-7426	INSERT: engine support, front (76040-20QL1123).	ea	--	2	•	•	•	•	•	•	--	--	B-6	15
X1	H		....	1 SEAL: tube to safety valve preformed packing (76040-446GC196).	--	--	--	--	--	--	K	K	K	--	--	B-6	21
X1	O		....	1 SEAL: flywheel timing indicator (76040-446GC1138).	--	--	--	K	K	K	K	K	K	--	--	B-6	24
P	F		2815-974-7514	SEAL: flywheel timing inspection cover (1) injection pump adapter inspection plug (1) (76040-446GC175).	ea	--	2	•	•	•	•	•	•	--	--	B-6	28
P	O		2930-890-9554	SEAL: preformed packing, water inlet fitting (1) thermostat bypass fitting (1) (76040-446GC155).	ea	--	2	•	•	•	•	•	•	--	--	B-6	26

P	F		2815-974-7515	SEAL: oil, crankshaft front (76040-446GC181).	ea	..	1	•	•	•	•	•	•	..	..	B-6	43
P	F		2815-974-7516	SEAL: oil, crankshaft rear (76040-446GC210A).	ea	..	1	•	•	•	•	•	•	..	..	B-6	19
P	F		2815-974-7518	SEAL: rocker arm front bracket (76040-446GC138B).	ea	..	2	•	•	•	•	•	•	..	..	B-6	37
P	O		2930-890-2553	SEAL: thermostat (76040-447GC146)	ea	..	1	•	•	•	•	•	•	..	..	B-6	45
P	O		2930-974-7517	SEAL: water manifold tube (76040-447GC148).	ea	..	2	•	•	•	•	•	•	..	..	B-6	28
P	F		5310-974-9677	WASHER: plain, fiber, 1/2-in. cyl head cover (76040-56AX326).	ea	..	7	•	•	•	•	•	•	..	..	B-6	41
P	F		2815-890-2348	GASKET SET: engine valve grind (76040-590GBA1227A).	ea	..	1	2	3	5	2	3	5	20	100	B-7	..
				Consists of:													
P	O		2815-974-7561	GASKET: crankcase breather (73040-590GB1176).	ea	..	2	•	•	•	•	•	•	..	..	B-7	11
P	O		2518-974-7551	GASKET: exhaust manifold center (76040-573GB144).	ea	..	2	•	•	•	•	•	•	..	..	B-7	18
P	F		2815-974-7541	GASKET: rocker arm cover (76040-554GB38).	ea	..	2	•	•	•	•	•	•	..	..	B-7	4
X1	F		....	1 GASKET: turbocharger exhaust elbow (76040-590GB1167A).	..	..	..	K	K	K	K	K	K	..	..	B-7	14
X1	O		....	1 GASKET: thermostat housing (76040-590GB1134).	..	..	..	K	K	K	K	K	K	..	..	B-7	17
P	O		2815-974-7542	GASKET: exhaust manifold ends (76040-560GB12A).	ea	..	4	•	•	•	•	•	•	..	..	B-7	2
P	O		2910-974-7559	GASKET: nozzle holder, inner (76040-590GB1127).	ea	..	6	•	•	•	•	•	•	..	..	B-7	10
P	F		2910-974-7560	GASKET: nozzle holder, outer (76040-590GB1148) (for engines FSN 2815-980-7092 and 28-51087-2273).	ea	..	6	•	•	•	•	•	•	..	..	B-7	6
P	F		2990-974-7547	GASKET: turbocharger, oil inlet (76040-56AX356).	ea	..	1	•	•	•	•	•	•	..	..	B-7	5
P	F		2990-974-7548	GASKET: turbocharger, oil drain (76040-56AX357).	ea	..	1	•	•	•	•	•	•	..	..	B-7	8
P	O		2530-974-7562	GASKET: turbocharger to exhaust manifold (76040-590GB1189).	ea	..	1	•	•	•	•	•	•	..	..	B-7	1
P	F		....	GASKET: nozzle holder, outer (76040-449GC120) (for engine FSN 2815-045-6665).	ea	..	6	•	•	•	•	•	•	..	..	B-7	6
P	O		2815-974-7550	GASKET: intake manifold (76040-573GB135).	ea	..	6	•	•	•	•	•	•	..	..	B-7	16

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1-20	(b) 21-50	(c) 51-100	(a) 1-20	(b) 21-50	(c) 51-100			(a) Fig. No.	(b) Item or Sym. No.
				0100—ENGINE ASSEMBLY—Continued													
P	O		2930-974-7572	GASKET: water outlet manifold (76040-605GB11B).	ea	..	4	*	*	*	*	*	*	..	..	B-7	15
P	F		2815-974-7513	SEAL: rocker arm front bracket (76040-446GC138B).	ea	..	2	*	*	*	*	*	*	..	..	B-7	7
P	F		2815-974-7514	SEAL: injection pump adapter inspection cover (76040-466GC175).	ea	..	1	*	*	*	*	*	*	..	..	B-7	12
P	O		2930-089-2553	SEAL: thermostat (76040-447GC46)	ea	..	1	*	*	*	*	*	*	..	..	B-7	3
P	F		5310-974-9677	WASHER: plain, fiber, 1/2 in., cyl head cover (76040-56AX326).	ea	..	7	*	*	*	*	*	*	..	..	B-7	9
P	F		....	BRACKET: front engine support (2 pieces) (76040-158GB3137).	ea	..	1	*	*	*	*	*	*	4	*	B-8	3
P	O		2815-974-7426	INSERT: front engine support **GASKET SET FSN 2815-890-2362) (76040-20QL1123).	ea	..	2	2	3	5	2	3	5	20	100	B-8	5
P	O		....	SCREW, CAP, HEXAGON HEAD: front engine support (76040-6AX696).	ea	..	2	2	2	3	2	2	8	10	20	B-8	1
P	O		2815-890-2351	SPACER: front engine support (76040-71RU11838).	ea	..	2	2	2	3	2	2	3	10	20	B-8	4
P	O		5310-023-4374	WASHER: lock (76040-36AX5)	ea	..	2	2	2	3	2	2	3	10	20	B-8	2
				0101—CRANKCASE, BLOCK, CYLINDER HEAD													
X1	O		....	Bracket; lifting front (for Engine FSN 2815-980-7092) (76040-158GB237).	ea	..	1	K	K	K	K	K	K	..	..	B-9	12
X1	O		....	BRACKET: lifting front (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-158GB249).	ea	..	1	K	K	K	K	K	K	..	..	B-9	12
X1	O		....	BRACKET: lifting front (for Engine FSN 2815-980-7092) (76040-158GB238).	ea	..	1	K	K	K	K	K	K	..	..	B-9	1
X1	O		....	BRACKET: lifting rear (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-158GB248).	ea	..	1	K	K	K	K	K	K	..	..	B-9	1
P	F		2815-974-7540	GASKET: cyl head (for Engine FSN 2815-980-7092) (76040-553GB178A).	ea	..	2	2	3	5	2	3	5	20	20	B-9	19
P	F		2815-889-6250	GASKET: cyl head (for Engine FSN 2815-087-2273 and FSN 2815-045-6865 (76040-553GB3234A).	ea	..	2	2	3	5	2	3	5	16	30	B-9	19

P	F		2815-974-7621	HEAD: cyl, assy (includes: guides, valves, springs and inserts) (for Engine FSN 2815-980-7092) (76040-732GBA1851).	ea	..	2	*	2	2	*	2	2	8	10	B-9	7
				Consists of:													
X1	F		....	1 HEAD: cyl assy (less valves) (76040-732GBA2623B).	..	..	..	K	K	K	K	K	K	..	..	B-9	8
				Consists of:													
X1	F		....	1 CYLINDER HEAD: (76040-732GB5183C).	..	..	..	K	K	K	K	K	K	..	..	B-9	9
X1	F		....	4 PLUG: 1 3/4-18 corehole (76040-49AX155).	..	..	..	K	K	K	K	K	K	..	..	B-9	15
P	F		2815-974-7514	SEAL: corehole plug "O" ring (76040-446GC175).	ea	..	4	2	2	3	2	2	3	20	40	B-9	14
X1	F		....	3 SLEEVE, NOZZLE HOLDER: (76040-12GC18AP1).	..	..	..	K	K	K	K	K	K	..	..	B-9	10
				Also includes items 5, 6, and 9, figure B-19													
P	F		5307-974-7577	STUD: injection nozzle (76040-616GC116A)	ea	..	12	2	2	3	2	2	3	20	120	B-9	11
P	F		5307-974-7422	STUD: exhaust manifold (76040-17AX84)	ea	..	12	2	4	7	2	4	7	60	120	B-9	20
				For balance of components see figure B-19													
P	F		....	HEAD: cyl assy (includes: guides, valves, springs and inserts) (for Engine FSN 2815-087-2273 and 2815-045-6865) (76040-732GBA1942B).	ea	..	2	*	2	2	*	2	2	10	20	B-9	7
				Consists of:													
X1	F		....	1 HEAD: cyl assy (less valves) (76040-732GBA2695B).	..	..	..	K	K	K	K	K	K	..	..	..	8
				Consists of:													
X1	F		....	1 CYLINDER HEAD: (76040-732GB-5218B).	..	..	..	K	K	K	K	K	K	..	..	B-9	9
X1	F		....	4 PLUG: 1 3/4-18 corehole (76040-49AX155).	..	..	..	K	K	K	K	K	K	..	..	B-9	15
P	F		2815-974-7514	SEAL: corehole plug "O" ring (76040-446GC175).	ea	..	4	2	2	3	2	2	3	20	40	B-9	14
X1	F		....	3 SLEEVE, NOZZLE HOLDER: (76040-12GC116).	..	..	..	K	K	K	K	K	K	..	...	B-9	10
				Also includes items 5, 6, and 9, figure B-19													
P	F		....	STUD: exhaust manifold (76040-17AX42)	ea	..	12	2	2	3	2	2	3	20	120	B-9	20
P	F		....	STUD: injection nozzle (76040-616GC156)	ea	..	12	2	2	3	2	2	3	20	120	B-9	11
				For balance of components see figure B-19													

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0101—CRANKCASE, BLOCK, CYLINDER HEAD—Continued													
P	F		2815-974-7425	INSERT: water hole seal (76040-186GB138) (for Engine FSN 2815-980-7092).	ea	..	4	2	2	2	2	2	2	12	40	B-9	17
P	F		5310-974-7438	NUT: 9/16-18 cyl head (reg) (for Engine FSN 2815-980-7092) (76040-21AX499).	ea	..	32	2	3	5	2	3	5	20	64	B-9	6
P	F		5310-023-2374	NUT: 9/16-18 cyl head, lh front (for Engine FSN 2815-980-7092) (76040-142GC128).	ea	..	2	2	2	3	2	2	3	10	20	B-9	18
P	F		5310-974-7419	NUT: 9/16-18 head, rh rear (for Engine FSN 2815-980-7092) (76040-142GC111).	ea	..	2	2	3	5	2	3	5	10	20	B-9	4
P	F		5310-023-2414	NUT: 5/8-11 cyl head (reg) (for Engine FSN 2815-087-2273 and 2815-045-6865) (76040-142GC157).	ea	..	36	2	2	2	2	2	2	10	72	B-9	6
P	F		5310-023-2360	NUT: 5/8-11 cyl head, lh front (for Engine FSN 2815-087-2273 and 2815-045-6865) (76040-142GC162).	ea	..	2	2	2	2	2	2	2	10	20	B-9	18
P	F		5310-023-2398	NUT: 5/8-11 cyl head, rh rear (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-142GC156).	ea	..	2	2	2	2	2	2	2	10	20	B-9	4
X1	F		....	SCREW: lifting bracket 9/16-18 NF x 1 1/4 (for Engine FSN 2815-980-7092) (76040-1AX304).	ea	..	4	K	K	K	K	K	K	..	..	B-9	2
X1	F		....	SCREW: lifting bracket 5/8-11 NF x 1 1/4 (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-1AX67).	ea	..	4	K	K	K	K	K	K	..	..	B-9	2
X1	F		....	SEAL: water hole insert (for Engine FSN 2815-980-7092) (76040-446GC1130).	ea	..	1	K	K	K	K	K	K	..	..	B-9	18
P	F		2815-974-7573	STUD: 9/16-18 cyl head (for Engine FSN 2815-980-7092) (76040-618GC175).	ea	..	36	2	2	3	2	2	3	20	72	B-9	16
P	F		5307-023-3398	STUD: 5/8-11 cyl head (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-610GC1116).	ea	..	40	2	2	3	2	2	3	20	80	B-9	16
P	F		5310-732-9135	WASHER: 9/16 cyl head (for Engine FSN 2815-980-7092) (76040-711GC1100P3).	ea	..	36	2	2	3	2	2	3	20	40	B-9	5

P	F	5310-023-4346	WASHER: 5/8 cyl head (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-711GC1100P7).	ea	--	40	2	2	3	2	2	3	20	44	B-9	5
X1	F	....	WASHER: 9/16 lifting bracket (for Engine FSN 2815-960-7092) (76040-36AX6).	ea	--	4	K	K	K	K	K	K	--	--	B-9	3
X1	F	....	WASHER: 5/8 lifting bracket (for Engine FSN 2815-087-2273 and 2815-045-6865) (76040-36AX7).	ea	--	4	K	K	K	K	K	K	--	--	B-9	3
X1	H	....	BLOCK: assy, cyl (includes all main brg caps and studs, corehole plugs, sleeves, seals, liners, screws, and bushings (for Engine FSN 2815-960-7092) (76040-239GBA1465).	ea	--	1	--	--	--	K	K	K	--	--	B-10	12
X1	H	....	BLOCK: assy, cyl (includes all main brg caps and studs, corehole plugs, sleeves, seals, liners, screws and bushings (for Engine FSN 2815-087-2273) (76040-239GBA1657).	ea	--	1	--	--	--	K	K	K	--	--	B-10	12
X1	F	....	COVER: oil filler hole (for Engine FSN 2815-087-2273 and 2815-045-6865) (76040-340GB11A).	ea	--	1	K	K	K	K	K	K	--	--	B-10	23
X1	F	....	COVER: water passage (76040-338GB11C)	ea	--	1	K	K	K	K	K	K	--	--	B-10	3
X1	O	....	ELBOW: water drain (76040-63AX891) ...	ea	--	1	K	K	K	K	K	K	--	--	B-10	28
X1	H	....	GASKET: oil filler hole (for Engine FSN 2815-087-2273) (**GASKET SET FSN 2815-890-2362) (76040-56AX262).	ea	--	1	--	--	--	K	K	K	--	--	B-10	22
P	O	5330-974-7543	GASKET: water passage cover (**GASKET SET FSN 2815-890-2362) (76040-56AX107).	ea	--	1	*	2	2	*	2	2	10	10	B-10	4
X1	H	....	NUT: main brg cap stud (76040-142GC131)	ea	--	1	--	--	--	K	K	K	--	--	B-10	15
X1	H	....	BLOCK: assy, cyl (includes all main brg caps and studs, corehole plugs, sleeves, seals, liners, screws and bushings (for Engine FSN 2815-045-6865) (76040-239GBA1675).	ea	--	1	--	--	--	K	K	K	--	--	B-10	12
P	H	2815-890-2347	PIN: crankshaft thrust washer (76040-183GC186).	ea	--	2	--	--	--	*	2	2	20	40	B-10	13
P	F	5315-695-9839	PIN: locating, cyl head (76040-31AX268)	ea	--	4	*	2	2	*	2	2	10	40	B-10	7
X1	F	....	PLUG: cyl corehole (76040-49AX155)	ea	--	10	K	K	K	K	K	K	--	--	B-10	11
P	F	4730-974-7449	PLUG: main oil line center (76040-259GC119).	ea	--	1	*	2	2	*	2	2	10	40	B-10	9
P	F	4730-974-7452	PLUG, CYLINDER: main oil, front and rear (76040-262GC15B).	ea	--	2	*	2	3	*	2	2	6	10	B-10	5
X1	F	....	PLUG: oil level indicator, front (76040-266-GC11).	ea	--	1	K	K	K	K	K	K	--	--	B-10	20
X1	F	....	PLUG: oil level indicator, rear (76040-1CF1703).	ea	--	1	K	K	K	K	K	K	--	--	B-10	26

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0101—CRANKCASE, BLOCK, CYLINDER HEAD—Continued													
P	F		5305–021–2323	SCREW: main brg cap, front (76040–409-GC148).	ea	..	1	*	2	2	*	2	2	10	15	B–10	16
P	F		5305–021–2349	SCREW: main brg cap (76040–409GC152)	ea	..	16	2	2	3	2	2	3	20	160	B–10	17
X1	F		....	SCREW: water passage cover (76040–4AX24).	ea	..	2	K	K	K	K	K	K	..	..	B–10	1
X1	F		....	SCREW: oil filler cover (for Engine FSN 2815–087–2273 and FSN 2815–045–6865) (76040–4AX76).	ea	..	2	K	K	K	K	K	K	..	..	B–10	25
P	F		2815–974–7514	SEAL: cyl corehole (76040–446GC175)	ea	..	10	2	2	3	2	2	3	20	100	B–10	10
X1	F		....	STUD: front brg cap (76040–612GC18)	ea	..	1	K	K	K	K	K	K	..	..	B–10	14
X1	F		....	TUBE: main oil line (76040–259GC13)	ea	..	1	K	K	K	K	K	K	..	..	B–10	8
P	O		4820–769–7694	VALVE: water drain, lower (76040–61AX53).	ea	..	1	*	2	2	*	2	2	10	10	B–10	27
P	O		4820–890–5018	VALVE: water drain, upper (76040–61AX68) (For Engine FSN 2815–980–9072 and FSN 2815–087–2273).	ea	..	1	*	2	2	*	2	2	10	10	B–10	29
P	H		5310–023–4354	WASHER: main brg cap (76040–711GC-133A).	ea	..	18	6	12	20	6	12	20	180	300	B–10	18
P	O		....	VALVE: water drain, upper (for Engine FSN 2815–045–6865) (76040–61AX54).	ea	..	1	*	2	2	*	2	2	10	10	B–10	29
P	F		5310–333–7450	WASHER: 57/64 main oil line plug gasket (76040–39AX23).	ea	..	2	*	2	2	*	2	2	10	20	B–10	6
X1	F		....	WASHER: oil filler cover (for Engine FSN 2815–087–2273 and FSN 2815–045–6865) (76040–36AX22).	ea	..	2	K	K	K	K	K	K	..	..	B–10	24
X1	F		....	WASHER: oil level indicator, front (76040–37AX14).	ea	..	1	K	K	K	K	K	K	..	..	B–10	19
X1	F		....	WASHER: oil level indicator, rear (76040–37AX420).	ea	.	1	K	K	K	K	K	K	..	..	B–10	21
X1	F		....	WASHER: 1/2 in. lock, water passage cover (76040–36AX5).	ea	..	2	K	K	K	K	K	K	..	..	B–10	2
				0102—CRANKSHAFT													
P	F		2815–974–7499	DAMPER: vibration (76040–404GB3131)	ea	..	1	*	2	2	*	2	2	6	10	B–11	5

X1	F		....	HUB: vibration damper (76040-788GB273)	ea	..	1	K	K	K	K	K	K	..	..	B-11	3
P	F		5315-974-7505	KEY: damper hub (76040-42AX550)	ea	..	1	*	2	2	*	2	2	8	10	B-11	2
X1	F		....	PULLEY: crankshaft (76040-302GB2188A)	ea	..	1	K	K	K	K	K	K	..	..	B-11	6
P	F		5305-974-7509	SCREW: damper hub (76040-436GC16)	ea	..	1	*	2	2	*	2	2	6	10	B-11	7
P	F		5305-539-8117	SCREW: cap 3/8-16 NC x 7/8 crankshaft pulley (76040-6AX819).	ea	..	6	2	2	3	2	2	3	20	60	B-11	8
P	F		2815-890-2353	SPACER: vibration damper and pulley hub (76040-537GC116).	ea	..	1	*	2	2	*	2	2	6	10	B-11	1
P	F		5310-023-4308	WASHER: crankshaft pulley (76040-711GC134).	ea	..	6	2	2	3	2	2	3	20	60	B-11	9
P	F		5310-023-4236	WASHER: hub aligning (76040-710GC122)	ea	..	1	*	2	2	*	2	2	6	10	B-11	4
P	H		2815-974-7592	BEARING SET: crankshaft main (std) (76040-64GBA11321).	ea	..	1	..	..	..	2	2	2	12	15	B-12	1
				Consists of:													
X1	H		....	1BEARING: rear (76040-64GB11330AP1).	..	..	..	..	..	..	K	K	K	..	..	B-12	3
X1	H		....	1 BEARING: ctr (76040-64GB11282AP1).	..	..	..	..	..	..	K	K	K	..	..	B-12	4
X1	H		....	4 BEARINGS: intermediate (76040-64GB11316P1).	..	..	..	..	..	..	K	K	K	..	..	B-12	5
X1	H		....	1 BEARING: front (76040-64GB11279AP1).	..	..	..	..	..	..	K	K	K	..	..	B-12	6
P	H		2815-974-7593	BEARING SET: crankshaft main (.010 undersize) (76040-64GBA11322).	ea	..	1	..	..	..	2	2	2	12	40	B-12	1
				Consists of:													
X1	H		....	1 BEARING: rear (76040-64GB11330AP10).	..	..	..	..	..	..	K	K	K	..	..	B-12	3
X1	H		....	1 BEARING: ctr (76040-64GB11282AP10).	..	..	..	..	..	..	K	K	K	..	..	B-12	4
X1	H		....	4 BEARINGS: intermediate (76040-64GB11316P10).	..	..	..	..	..	..	K	K	K	..	..	B-12	5
X1	H		....	1 BEARING: front (76040-64GB11279AP10).	..	..	..	..	..	..	K	K	K	..	..	B-12	6
P	H		2815-974-7594	BEARING SET: crankshaft main (.020 undersize) (76040-64GBA11323).	ea	..	1	..	..	..	2	2	2	12	45	B-12	1
				Consists of:													
X1	H		....	1 BEARING: rear (76040-64GB11330P20).	..	..	..	..	..	..	K	K	K	..	..	B-12	3
X1	H		....	1 BEARING: ctr (76040-64GB11282AP20).	..	..	..	..	..	..	K	K	K	..	..	B-12	4
X1	H		....	1 BEARING: intermediate (76040-64GB11316P20).	..	..	..	..	..	..	K	K	K	..	..	B-12	5

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1-20	(b) 21-50	(c) 51-100	(a) 1-20	(b) 21-50	(c) 51-100			(a) Fig. No.	(b) Item or Sym. No.
				0102—CRANKSHAFT—Continued													
X1	H		....	1 BEARING: front (76040-64GB11279AP20).	--	--	--	--	--	--	K	K	K	--	--	B-12	6
P	H	R	2815-974-7520	CRANKSHAFT: assy, engine (76040-456GC287A).	ea	--	1	*	*	*	*	*	*	4	*	B-12	7
				Consists of:													
X1	H		....	6 BOLTS: flywheel mounting (76040-102GB117P1).	ea	--	6	2	2	3	2	2	3	20	60	B-12	11
P	F		5306-974-7401	1 CRANKSHAFT: (76040-456GC545D) ..	ea	--	1	--	--	--	K	K	K	--	--	B-12	8
P	F		2815-974-7602	GEAR SET: engine timing (76040-688GBA112C).	ea	--	1	*	*	*	*	*	*	4	*	--	--
				Consists of:													
X1	F		....	1 GEAR: crankshaft (76040-670GB213C).	--	--	--	K	K	K	K	K	K	--	--	B-12	10
X1	F		....	1 GEAR: camshaft (76040-688GB21).	--	--	--	K	K	K	K	K	K	--	--	B-20	12
X1	F		....	1 GEAR: aux (76040-667GB21A) .... *Note.* Gears not available separately; supplied in matched sets only.	--	--	--	K	K	K	K	K	K	--	--	B-30	11
P	F		5315-974-7507	KEY: crankshaft gear (76040-42AX620)	ea	--	1	*	*	*	*	*	*	4	*	B-12	9
P	H		2815-974-7616	WASHER: thrust ctr main brg (std) (2 pieces) (76040-714GCA167P1).	ea	--	2	--	--	--	*	2	2	10	100	B-12	2
P	H		2815-974-7617	WASHER: thrust ctr main brg (.002 oversize) (2 pieces) (76040-714GCA167P2).	ea	--	2	--	--	--	*	2	2	10	100	B-12	2
				0103—FLYWHEEL ASSEMBLY													
P	F	R	2815-974-7535	FLYWHEEL: assy (76040-580GBA1273) ..	ea	--	1	*	*	*	*	*	*	4	*	B-13	3
				Consists of:													
X1	F		....	1 FLYWHEEL: (76040-580GB4267)	--	--	--	K	K	K	K	K	K	--	--	B-13	4
P	F		2815-974-7596	1 GEAR: flywheel ring (76040-673GB288)	--	--	--	*	*	*	*	*	*	4	*	B-13	6
P	F		5315-974-7463	1 PIN: flywheel locating (76040-31AX491)	--	--	--	*	*	*	*	*	*	4	*	B-13	5
P	F		5310-732-0601	NUT: 5/8-18 flywheel (76040-21AX45)	ea	--	6	2	3	5	2	3	5	30	60	B-13	2
P	F		5315-013-7185	PIN: 1/8 dia x 1, cotter (76040-29AX12) ...	ea	--	6	2	3	5	2	3	5	24	60	B-13	1

X1	F		....	COVER: timing inspection (76040-340GB142).	ea	..	1	K	K	K	K	K	K	..	..	B-14	9
X1	F		....	HOUSING: flywheel (76040-684GC5178)	ea	..	1	K	K	K	K	K	K	..	..	B-14	1
X1	F		....	INDICATOR: timing (76040-796GB1111) ..	ea	..	1	K	K	K	K	K	K	..	..	B-14	11
X1	F		....	PIN: dowel (76040-31AX119)	ea	..	2	K	K	K	K	K	K,	..	..	B-14	7
X1	F		....	PLUG: 3/4 NPT timing inspection hole cover (76040-63AX27).	ea	..	1	K	K	K	K	K	K	..	..	B-14	14
X1	F		....	PLUG: 3/8 NPT flywheel housing hole (76040-63AX45).	ea	..	1	K	K	K	K	K	K	..	..	B-14	2
P	H		2815-974-7516	SEAL: crankshaft rear (**GASKET SET FSN 2815-890-2362) (76040-446GC210A).	ea	..	1	..	..	..	*	2	2	10	20	B-14	6
P	F		2815-974-7514	SEAL: flywheel timing inspection cover (**GASKET SET FSN 2815-890-2362) (76040-446GC175).	ea	..	1	2	2	3	2	2	3	20	40	B-14	8
X1	O		....	SEAL: flywheel timing indicator (** GASKET SET FSN 2815-890-2362) (76040-446GC1138).	ea	..	1	K	K	K	K	K	K	..	..	B-14	10
X1	F		....	SCREW: 3/8-16 NC x 3/4 (76040-6AX847) ..	ea	..	2	K	K	K	K	K	K	..	..	B-14	15
X1	F		....	SCREW: housing (76040-6AX1231)	ea	..	8	K	K	K	K	K	K	..	..	B-14	4
X1	F		....	SCREW: 1/4-20 NC x 1/2 (76040-4AX6)	ea	..	1	K	K	K	K	K	K	..	..	B-14	13
X1	F		....	WASHER: housing (76040-711GC133A)	ea	..	8	K	K	K	K	K	K	..	..	B-14	3
X1	F		....	WASHER: 1/4 in. lock (76040-36AX1)	ea	..	1	K	K	K	K	K	K	..	..	B-14	12
P	F		5310-732-3282	WASHER: 3/8 plain (76040-37AX7)	ea	..	2	*	*	*	*	*	*	..	..	B-14	16
X1	F		....	WIRE: soft lock (76040-236AX15)	..	..	≠	K	K	K	K	K	K	..	..	B-14	5
				0104—PISTONS, CONNECTING RODS													
P	H		2815-890-2356	BEARING PAIR: connecting rod (std) (76040-626BA1339P1).	ea	..	1	..	..	..	2	2	2	12	24	B-15	11
P	H		2815-974-7578	BEARING SET: connecting rod (std) (6 pr) (76040-62GBA1342P1).	ea	..	1	..	..	..	2	2	2	12	20	B-15	11
P	H		2815-974-7579	BEARING SET: connecting rod (.010 undersize) (6 pr) (76040-62GBA1342P10).	ea	..	1	..	..	..	2	2	3	20	36	B-15	11
P	H		2815-733-2302	BUSHING: wristpin (76040-187GB11)	ea	..	6	..	..	..	2	3	5	30	60	B-15	9
P	H		2815-889-6215	CONNECTING ROD: assy w/bushing (for Engine FSN 2815-950-7092) (96040-367GCA3130AP2).	ea	..	6	..	..	..	2	3	5	30	55	B-15	10
P	H		2815-862-0095	CONNECTING ROD: assy w/bushing (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-367GCA3141P2).	ea	..	6	..	..	..	2	3	5	30	55	B-15	10
P	H		5340-974-7474	RETAINER: wristpin (76040-355GC16A) .	ea	..	12	..	..	..	2	4	7	60	120	B-15	8

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0104—PISTONS, CONNECTING RODS—Continued													
P	H		....	RING SET: piston std re-ring (76040–353GC153BB).	ea	--	1	--	--	--	2	2	2	12	24	--	--
				Consists of:													
X1	H		....	18 COMPRESSION RINGS NO. 1, 2 & 3 (76040–349GC350P1).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	12 OIL CONTROL RINGS (76040–350GC319P1).	--	--	--	--	--	--	K	K	K	--	--	--	--
P	H		....	RING SET: piston individual re-ring (for Engine FSN 2815–980–7092) (76040–353GC1541B).	ea	6	--	--	--	--	2	2	2	12	24	--	--
				Consists of:													
X1	H		....	3 COMPRESSION RING NO. 1, 2 & 3 (76040–349GC350P1).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	2 OIL CONTROL RINGS (76040–350GC319P1).	--	--	--	--	--	--	K	K	K	--	--	--	--
P	H		2815–889–6216	RING SET: piston std re-ring (for Engine FSN 2815–980–7092) (76040–353GC1538B).	ea	--	1	--	--	--	2	2	2	12	24	B–15	2
				Consists of:													
X1	H		....	6 COMPRESSION RINGS NO. 1: (76040–349GC10313AP1).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	12 COMPRESSION RINGS NOS. 2 & 3: (76040–349GC10314).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	12 OIL CONTROL RINGS: (76040–350GC1355).	--	--	--	--	--	--	K	K	K	--	--	--	--
P	H		2815–889–6217	RING SET: piston individual re-ring (for Engine FSN 2815–980–7092) (76040–353GC1541B).	ea	6	--	--	--	--	2	2	2	12	24	B–15	5
				Consists of:													
X1	H		....	1 COMPRESSION RING NO. 1: (76040–349GC10313AP1).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	2 COMPRESSION RINGS NOS. 2 & 3: (76040–349GC10314).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	2 OIL CONTROL RINGS: (76040–350GC1355).	--	--	--	--	--	--	K	K	K	--	--	--	--

P	H		2815-889-6220	RING SET: piston std (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-353GC1616).	ea	..	1	..	..	..	2	2	2	12	24	B-15	2
				Consists of:													
X1	H		....	18 COMPRESSION RINGS: (76040-349GC350P1).	..	..	..	..	..	..	K	K	K	..	..	..	..
X1	H		....	6 OIL CONTROL RINGS: (76040-350GC319P1).	..	..	..	..	..	..	K	K	K	..	..	..	..
P	H		2815-889-6223	RING SET: piston individual re-ring (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-353GC24).	ea	..	6	..	..	..	2	2	2	12	24	B-15	2
				Consists of:													
X1	H		....	3 COMPRESSION RINGS: (76040-349GC350).	..	..	..	..	..	..	K	K	K	..	..	..	..
X1	H		....	1 OIL CONTROL RING: (76040-350GC319P1).	..	..	..	..	..	..	K	K	K	..	..	..	..
P	H		5305-974-7498	SCREW: connecting rod (for Engine FSN 2815-980-7092) (76040-396GC111A).	ea	..	12	..	..	..	*	2	2	10	60	B-15	12
P	H		....	SCREW: connecting rod (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-396GC130P1).	ea	..	12	..	..	..	*	2	2	10	60	B-15	12
P	H		2815-974-7531	SLEEVE AND PISTON: assy, engine, cyl (std) (for Engine FSN 2815-980-7092) (76040-509GCA120).	ea	..	6	..	..	..	2	3	5	30	60	B-15	1
				Consists of:													
X1	H		....	1 SLEEVE: (76040-509GC3153P1)	..	..	..	..	..	..	K	K	K	..	..	B-15	3
X1	H		....	1 PISTON: (76040-2406GC41128B-P1)	..	..	..	..	..	..	K	K	K	..	..	B-15	6
X1	H		....	1 INDIVIDUAL RING SET: (76040-353GC1541B).	..	..	..	..	..	..	K	K	K	..	..	B-15	2
X1	H		....	1 WRISTPIN: (76040-182GC1335A)	..	..	..	..	..	..	K	K	K	..	..	B-15	7
P	H		5340-974-7474	2 RETAINERS: (76040-355GC16A)	..	..	..	..	..	..	*	*	*	..	..	B-15	8
P	H		2815-889-6225	SLEEVE AND PISTON: assy engine, cyl (std) (for Engine FSN 2815-087-2273 and FSN 2815-045-6865) (76040-509GCA123).	ea	..	6	..	..	..	2	2	2	12	24	B-15	4
				Consists of:													
X1	H		....	1 SLEEVE: (76040-509GC122P1)	..	..	..	..	..	..	K	K	K	..	..	B-15	3
X1	H		....	1 PISTON: (76040-240GC41293P1)	..	..	..	..	..	..	K	K	K	..	..	B-15	6
X1	H		....	1 INDIVIDUAL RING SET: (76040-353GC24).	..	..	..	..	..	..	K	K	K	..	..	B-15	5
X1	H		....	1 WRISTPIN: (76040-182GC1352P1)	..	..	..	..	..	..	K	K	K	..	..	B-15	7
P	H		5340-974-7474	2 RETAINERS: (76040-355GC16A)	..	..	..	..	..	..	*	*	*	..	..	B-15	8
				0105—VALVES, CAMSHAFTS, AND TIMING SYSTEM													
P	O		2815-974-7442	CAP: oil filler spout (76040-222GB23)	ea	..	1	*	2	2	*	2	2	10	10	B-16	3

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(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0105—VALVES, CAMSHAFTS, AND TIMING SYSTEM—Continued													
X1	O		--------------	CHAIN: filler spout cap (76040–1AB1805) ..	ea	--	1	K	K	K	K	K	K	--	--	B–16	4
P	O		4730–890–2886	CLAMP: turbocharger inlet hose (76040–180GB135).	ea	--	1	*	2	2	*	2	2	6	30	B–16	7
X1	O		--------------	COVER: rocker arm (front) (76040–337GBA353P1).	ea	--	1	K	K	K	K	K	K	--	--	B–16	10
X1	O		--------------	COVER: rocker arm (rear) (76040–337GB247).	ea	--	1	K	K	K	K	K	K	--	--	B–16	8
X1	O		--------------	COVER: valve lifter (front) (76040–358GB332).	ea	--	1	K	K	K	K	K	K	--	--	B–16	14
X1	O		--------------	COVER: valve lifter (rear) (76040–358GB330).	ea	--	1	K	K	K	K	K	K	--	--	B–16	18
X1	O		--------------	ELBOW: turbocharger drain (76020–13AX520).	ea	--	1	K	K	K	K	K	K	--	--	B–16	17
P	F		2815–974–7541	GASKET: rocker arm cover (**GASKET SETS FSN 2815–890–2362 and FSN 2815–890–2348) (76040–554GB38).	ea	--	2	2	2	3	2	2	3	24	40	B–16	11
P	F		2815–974–7571	GASKET: valve lifter cover (**GASKET SET FSN 2815–890–2362) (76040–601GB31A).	ea	--	2	2	2	3	2	2	3	20	40	B–16	18
P	F		2910–890–2539	HOSE: assy, crankcase discharge (76040–36RUA3133P33).	ea	--	1	*	2	2	*	2	2	6	12	B–16	6
X1	F		--------------	PLATE: name (76040–247GC149P1)	ea	--	1	K	K	K	K	K	K	--	--	B–16	9
X1	F		--------------	PLATE: instruction, valve clearance (76040–247GC135A).	ea	--	1	K	K	K	K	K	K	--	--	B–16	12
X1	F		--------------	RETAINER: oil cap chain (76040–258GB1269).	ea	--	1	K	K	K	K	K	K	--	--	B–16	5
P	F		5305–974–7501	SCREW: 3/8-16 x 1 1/2-in. lg rocker arm cover (76040–421GC121).	ea	--	6	2	4	7	2	4	7	60	60	B–16	1
P	F		5305–021–2268	SCREW: 3/8–16 x 3/4-in. lg valve lifter cover (76040–6AX347).	ea	--	28	3	6	11	3	6	11	100	140	B–16	16
P	F		5310–974–9677	WASHER: plain, fiber, 1/2-in. rocker arm cover (**GASKET SETS FSN 2815–890–2348 and 2815–890–2362) (76040–56AX326).	ea	--	7	2	4	7	2	4	7	60	60	B–16	2

P	F		5310-734-3232	WASHER: plain 25/64 in., valve lifter cover (76040-37AX7).	ea	..	28	3	6	11	3	6	11	100	140	B-16	15
X1	F		....	COVER: timing gear assy (finished) (76040-333GBA141C).	ea	..	1	K	K	K	K	K	K	..	..	B-17	2
				Consists of:													
X1	F		....	1 COVER: injection pump timing (76040-370GB25).	..	..	..	K	K	K	K	K	K	..	..	B-17	7
P	F		5310-974-7437	NUT: 5/8-18 stop (76040-21AX338)	ea	..	2	*	2	2	*	2	2	10	20	B-17	13
P	F		5305-974-7497	SCREW: 5/8-18 assy thrust (76040-395GCA110).	ea	..	2	*	2	2	*	2	2	10	20	B-17	16
P	F		2815-974-7515	SEAL: crankshaft front oil (**GASKET SET FSN 2815-890-2362) (76040-446GC181).	ea	..	1	*	2	2	*	2	2	10	10	B-17	9
P	F		5310-974-7496	WASHER: nonferrous 41/64, thrust (76040-39AX25).	ea	..	2	*	2	2	*	2	2	10	20	B-17	14
P	F		2815-974-7539	GASKET: timing gear cover (**GASKET SET FSN 2815-890-2362) (76040-548GB41A).	ea	..	1	*	2	2	*	2	2	10	10	B-17	1
P	F		2815-974-7568	GASKET: injection pump timing cover (**GASKET SET FSN 2815-890-2362) (76040-590GB236).	ea	..	1	*	2	2	*	2	2	10	10	B-17	3
X1	F		....	INDICATOR: engine timing (76040-796GB311).	ea	..	1	K	K	K	K	K	K	..	..	B-17	4
X1	F		....	SCREW: 3/8-16 x 7/8 timing gear cover (76040-6AX862).	ea	..	15	K	K	K	K	K	K	..	..	B-17	15
X1	F		....	SCREW: 5/16-24 x 7/8 timing hole cover (76040-34AX1640).	ea	..	6	K	K	K	K	K	K	..	..	B-17	11
X1	F		....	SCREW: 5/16-24 x 3/4 timing hole cover (wire seal) (76040-3AX1641).	ea	..	2	K	K	K	K	K	K	..	..	B-17	8
X1	F		....	SCREW: 3/8-16 x 1 1/4 timing indicator (76040-6AX874).	ea	..	2	K	K	K	K	K	K	..	..	B-17	6
P	F		2910-974-7518	SEAL: injection pump cover screw wire (76040-449GC112A).	ea	..	1	*	2	2	*	2	2	8	15	B-17	10
P	F		5310-732-3232	WASHER: 3/8 plain, (15) timing gear cover, (2) timing indicator (76040-37AX7).	ea	..	17	2	4	7	2	4	7	54	110	B-17	5
X1	F		....	WASHER: 5/16 timing hole cover (76040-37AX421).	ea	..	8	K	K	K	K	K	K	..	..	B-17	12
X1	F		....	BRACKET: rocker arm shaft (front) (76040-146GB172A).	ea	..	2	K	K	K	K	K	K	..	..	B-18	12
X1	F		....	BRACKET: rocker arm shaft (center and rear) (76040-146GB225A).	ea	..	4	K	K	K	K	K	K	..	..	B-18	16
X1	F		....	CAP: rocker arm shaft (76040-227GB11) ..	ea	..	2	K	K	K	K	K	K	..	..	B-18	4

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0105—VALVES, CAMSHAFTS, AND TIMING SYSTEM—Continued													
P	F		5310–974–7441	NUT: 7/16-20 valve adjusting (76040–21AX750).	ea	..	12	2	4	7	2	4	7	60	120	B–18	2
P	F		2815–890–2357	ROCKER ARM ENGINE POPPET VALVE: exhaust (76040–44GBA2123).	ea	..	6	2	2	3	2	2	3	20	60	B–18	13
P	F		2815–890–2355	ROCKER ARM ENGINE POPPET VALVE: intake (76040–44GB2124).	ea	..	6	2	2	3	2	2	3	20	60	B–18	3
P	F		2815–974–7492	ROD: valve lifter push (76040–369GCA-1140).	ea	..	12	2	2	3	2	2	3	20	60	B–18	18
P	F		5305–018–0149	SCREW: 7/16-14 x 1 1/2 rocker arm bracket (76040–4AX140).	ea	..	6	*	2	2	*	2	2	10	20	B–18	7
P	F		5305–974–7506	SCREW: 7/16-14 x 4 rocker arm bracket (76040–4AX262).	ea	..	6	*	2	2	*	2	2	10	20	B–18	9
P	F		5305–699–6637	SCREW: set 3/8-16 x 1 5/16 rocker arm shaft (76040–6AX421).	ea	..	2	*	2	2	*	2	2	10	20	B–18	8
P	F		5305–974–7500	SCREW: valve adjusting (76040–417GB13B–P1).	ea	..	12	2	4	7	2	4	7	60	120	B–18	19
P	F		2815–974–7513	SEAL: rocker arm bracket, front (**GASKET SET FSN 2815–890–2362) (76040–446GC138B).	ea	..	2	2	2	3	2	2	3	20	20	B–18	14
P	F		2815–974–7523	SHAFT: rocker arm (76040–466GC247A)	ea	..	2	*	2	2	*	2	2	8	8	B–18	6
P	F		2805–695–6702	SPRING: inner rocker arm shaft (76040–574GC15).	ea	..	4	2	2	2	2	2	2	12	24	B–18	15
P	F		2815–974–7552	SPRING: outer rocker arm shaft (76040–574GC14A).	ea	..	4	2	2	2	2	2	2	12	24	B–18	1
P	F		2815–974–7619	TAPPET, ENGINE POPPET VALVE: lifter (76040–72GCA1135B).	ea	..	12	2	2	2	2	2	2	12	48	B–18	17
P	F		5310–023–4217	WASHER: 7/16 plain, rocker arm bracket (76040–37AX166).	ea	..	12	2	4	7	2	4	7	60	120	B–18	10
P	F		5310–974–7478	WASHER: 3/8 lock, rocker shaft screw (76040–36AX3).	ea	..	2	2	2	3	2	2	3	24	20	B–18	11
X1	F		....	WASHER: rocker shaft cap (76040–37AX419).	ea	..	2	K	K	K	K	K	K	K	..	B–18	5
				HEAD: cyl, assy (includes: guides, valves, springs and inserts).	..	..	Ref.	..	..	..	..	..	..	..	..	B–19	10

			Consists of:													
P	H	2815–974–7615	GUIDE: valve stem (76040–714GB1308P2).	ea	..	12	..	..	..	2	2	2	12	90	B–19	5
P	H	2815–974–7417	INSERT: exhaust (76040–13GC1238P1)	ea	..	6	..	..	..	2	3	5	30	60	B–19	9
P	H	2815–974–7418	INSERT: intake (76040–13GC1239P1)	ea	..	6	..	..	..	2	2	2	12	60	B–19	6
P	F	2815–650–3093	KEY: valve spring washer (76040–54GC19).	ea	..	24	2	3	6	2	3	6	50	240	B–19	1
P	F	2815–974–7620	ROTATOR: valve (76040–722GB29C)	ea	..	12	2	2	3	2	2	3	24	48	B–19	2
P	F	2815–974–7553	SPRING: valve, inner (76040–575GC172)	ea		12	2	3	5	2	3	5	36	72	B–19	4
P	F	2815–974–7554	SPRING: valve, outer (76040–57GC173)	ea		12	2	3	5	2	3	5	36	72	B–19	3
P	F	2815–904–9407	VALVE: exhaust (76040–688GC2321)	ea		6	3	5	8	3	5	8	30	60	B–19	8
P	F	2815–890–2354	VALVE: intake (76040–690GC122)	ea		6	3	5	8	3	5	8	30	60	B–19	7
			For balance of components see figure B–9													
P	H	2815–974–7558	BEARING SET: camshaft (std) (76040–59GBA1123).	ea	..	1	..	..	..	2	2	2	12	24	B–20	7
			Consists of:													
X1	H		1 BEARING: front (76040–59GB188AP1)	..		..	..	..	..	K	K	K	..	..	B–20	11
X1	H	......	2 BEARINGS: (int, Nos. 2 and 5) (76040–59GB1122P1).	..		..	..	..	..	K	K	K	..	..	B–20	10
X1	H	......	3 BEARINGS: (int, Nos. 3, 4 and 6) (76040–59GB1109AP1).	..	..	..	..	..	..	K	K	K	..	..	B–20	9
X1	H	...	1 BEARING: rear (76040–59GB122B)	..	..	..	..	..	..	K	K	K	..	..	B–20	8
P	F	2815–974–7519	CAMSHAFT: engine (76040–454GC4160)	ea	..	1	*	*	*	*	*	*	4	*	B–20	14
X1	F	......	COVER: camshaft, rear (76040–1CF1298) (for Engine FSN 2815–980–7092 and 2815–087–2273).	ea	..	1	K	K	K	K	K	K	..	..	B–20	3
P	F	2815–974–7536	GASKET: camshaft rear cover (**GASKET SET FSN 2815–890–2362) (76040–538GB11) (for Engine FSN 2815–980–7092 and 2815–087–2273).	ea	..	1	*	2	2	*	2	2	10	10	B–20	4
X1	F	......	PLUG: camshaft, rear (for Engine FSN 2815–045–6865) (76040–277GC116).	ea	..	1	K	K	K	K	K	K	..	..	..	
P	F	2815–974–7602	GEAR SET: engine timing (76040–688GBA112C).	ea	..	1	*	*	*	*	*	*	4	*		
			Consists of:													
X1	F	......	1 GEAR: camshaft (76040–668GB21A)	..	..	..	K	K	K	K	K	K	..	..	B–20	12
X1	F	......	1 GEAR: crankshaft (76040–670GB213C)	..	..	..	K	K	K	K	K	K	..	..	B–12	10
X1	F	......	1 GEAR: auxiliary (76040–667GB21A)	..	..	..	K	K	K	K	K	K	..	..	B–30	11
			Note. Gears not supplied separately; supplied in matched sets only.													
P	F	5315–694–8367	KEY: camshaft gear (76040–42AX214)	ea	..	1	*	*	*	*	*	*	4	*	B–20	13

(1) Source, Maint. and Recov. Code (a) Source	(1) (b) Maint.	(1) (c) Recov.	(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw. (a) 1–20	(7) (b) 21–50	(7) (c) 51–100	(8) 30-Days GS Maint. Alw. (a) 1–20	(8) (b) 21–50	(8) (c) 51–100	(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration (a) Fig. No.	(11) (b) Item or Sym. No.
				0105—VALVES, CAMSHAFTS, AND TIMING SYSTEM—Continued													
P	F		5315–693–0048	PIN: thrust washer (76040-62AX65)	ea	--	1	2	2	2	2	2	2	15	30	B–20	6
P	H		5305–068–0500	SCREW: 1/4-20 x 1/2 (76040–4AX6)	ea	--	8	--	--	--	2	3	6	48	95	B–20	1
P	H		5310–023–3470	WASHER: 1/4 lock (76040–36AX1)	ea	--	8	--	--	--	2	3	6	48	95	B–20	2
P	F		5310–974–7616	WASHER: camshaft thrust (76040–701GC11A).	ea	--	1	*	*	*	*	*	*	4	*	B–20	5
				0106—ENGINE LUBRICATION SYSTEM													
X1	F		....	BRACKET: wire (76040–253GC1272)	ea	--	1	K	K	K	K	K	K	--	--	B–21	21
P	O		2940–890–2561	CLAMP: tube (76040–83AX226)	ea	--	2	*	2	2	*	2	2	8	12	B–21	7
P	O		4730–919–8788	FITTING: tube (76040–63AX483)	ea	--	2	*	2	2	*	2	2	8	14	B–21	11
P	O		2815–974–7561	GASKET: breather pipe (**GASKET SETS FSN 2815–890–2362 and FSN 2815–890–2348) (76040–590GB1176).	ea	--	2	2	3	6	2	3	6	40	40	B–21	5
X1	F		....	LINK: valve control (76040–922GC134)	ea	--	1	K	K	K	K	K	K	--	--	B–21	14
X1	F		....	LOOM: tube clamp (76040–676AX1)	ea	--	2	K	K	K	K	K	K	--	--	B–21	6
P	O		2940–890–2562	NIPPLE: ventilation valve (76040–63AX376).	ea	--	2	*	2	2	*	2	2	8	10	B–21	13
X1	O		....	NUT: compression sleeve, tube fitting (76040–63AX362).	ea	--	2	K	K	K	K	K	K	--	--	B–21	9
X1	O		....	NUT: wire bracket (76040–20AX1)	ea	--	1	K	K	K	K	K	K	--	--	B–21	19
X1	O		....	PIN: cotter, valve link swivel (76040–29AX1).	ea	--	1	K	K	K	K	K	K	--	--	B–21	15
X1	O		....	PIPE: breather (76040–191GC340)	ea	--	1	K	K	K	K	K	K	--	--	B–21	3
X1	O		....	SCREW: breather pipe (76040–4AX123)	ea	--	3	K	K	K	K	K	K	--	--	B–21	1
X1	O		....	SCREW: wire bracket (76040–1AX374)	ea	--	1	K	K	K	K	K	K	--	--	B–21	22
P	O		2910–890–2522	SCREW: valve link swivel (76040–9AX59).	ea	--	1	*	2	2	*	2	2	6	12	B–21	18
X1	O		....	SLEEVE: tube (76040–52AX6)	ea	--	2	K	K	K	K	K	K	--	--	B–21	10
P	O		5307–023–3386	STUD: breather pipe (76040–616GC136)	ea	--	1	*	2	2	*	2	2	6	10	B–21	4
P	O		4730–890–2376	SWIVEL: valve link (76040–188GC161)	ea	--	1	*	2	2	*	2	2	6	10	B–21	17
X1	O		....	TUBE: ventilation (76040–283GC3100)	ea	--	2	K	K	K	K	K	K	--	--	B–21	8
X1	O		....	VALVE: ventilation (76040–695GC119)	ea	--	2	K	K	K	K	K	K	--	--	B–21	12
X1	O		....	WASHER: breather pipe (76040–37AX1)	ea	--	5	K	K	K	K	K	K	--	--	B–21	2

P	O	5310-023-4225	WASHER: valve link swivel (76040-37AX345).	ea	--	1	*	2	2	*	2	2	6	12	B-21	16
X1	O	....	WASHER: wire bracket (76040-56AX326)	ea	--	1	K	K	K	K	K	K	--	--	B-21	20
X1	F	....	BRACKET: oil cooler rear mount (76040-143GB19).	ea	--	1	K	K	K	K	K	K	--	--	B-22	15
X1	F	....	BODY: water outlet (76040-493GB382)	ea	--	1	K	K	K	K	K	K	--	--	B-22	5
X1	F	....	COLLER: oil (76040-312GB327AP2)	ea	--	1	K	K	K	K	K	K	--	--	B-22	10
X1	F	....	COVER: water inlet, rear (76040-493GB2142A).	ea	--	1	K	K	K	K	K	K	--	--	B-22	16
X1	F	....	ELBOW: inlet tube (76040-63AX440)	ea	--	2	K	K	K	K	K	K	--	--	B-22	11
X1	F	....	ELBOW: oil-sending unit (76040-63AX891)	ea	--	1	K	K	K	K	K	K	--	--	B-22	26
X1	F	....	ELBOW: water pump inlet (76040-493GB2157).	ea	--	1	K	K	K	K	K	K	--	--	B-22	32
X1	F	....	FITTING: water outlet (76040-493GB163)	ea	--	1	K	K	K	K	K	K	--	--	B-22	3
P	O	2930-974-7549	GASKET: water pump inlet housing and elbow (**GASKET SET FSN 2815-890-2362) (76040-56AX392).	ea	--	2	2	2	3	2	2	3	20	100	B-22	6
X1	H	....	GASKET: oil cooler cover and housing (**GASKET SET FSN 2815-890-2362) (76040-549GB114A).	ea	--	2	--	--	--	K	K	K	--	--	B-22	9
P	F	2990-974-7548	GASKET: inlet and outlet tube (at cooler) (**GASKET SET FSN 2815-890-2362) (76040-56AX357).	ea	--	2	*	2	2	*	2	2	10	20	B-22	23
X1	H	....	GASKET: inlet tube (at filter base) (**GASKET SET FSN 2815-890-2362) (76040-590GB1246).	ea	--	1	--	--	--	K	K	K	--	--	B-22	20
X1	H	....	GASKET: inlet tube (at filter base) (**GASKET SET FSN 2815-890-2362) (76040-590GB1245).	ea	--	1	--	--	--	K	K	K	--	--	B-22	19
X1	F	....	NUT: water inlet tube (76040-142GC165)	ea	--	2	K	K	K	K	K	K	--	--	B-22	13
X1	F	....	NUT: 1/4-28 NF stud (76040-20AX1)	ea	--	1	K	K	K	K	K	K	--	--	B-22	7
X1	F	....	SCREW: 7/16-14 NC x 2 1/2 inlet housing (76040-4AX280).	ea	--	2	K	K	K	K	K	K	--	--	B-22	30
X1	F	....	SCREW: 5/16-18 NC x 1 cover and housing (76040-4AX5).	ea	--	11	K	K	K	K	K	K	--	--	B-22	1
X1	F	....	SCREW: 5/16-18 NC x 5/8 bracket to block (76040-4AX76).	ea	--	3	K	K	K	K	K	K	--	--	B-22	18
X1	F	....	SCREW: 3/8-16 NC x 7/8 tube to filter base (76040-4AX58).	ea	--	4	K	K	K	K	K	K	--	--	B-22	25
X1	F	....	SCREW: 3/8-16 NC x 1 tube (2) inlet and (1) outlet (76040-4AX1).	ea	--	3	K	K	K	K	K	K	--	--	B-22	24
X1	F	....	SCREW: 3/8-16 NC x 1 tube, oil outlet (76040-6AX1142).	ea	--	1	K	K	K	K	K	K	--	--	B-22	29

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1-20	(b) 21-50	(c) 51-100	(a) 1-20	(b) 21-50	(c) 51-100			(a) Fig. No.	(b) Item or Sym No.
				0106—ENGINE LUBRICATION SYSTEM—Continued													
P	O		2930-890-2554	SEAL: preformed packing water inlet fitting (**GASKET SET FSN 2815-890-2362) (76040-446GC155).	ea	--	2	*	2	2	*	2	2	8	16	B-22	4
X1	F			SLEEVE: water inlet tube (76040-52AX13)	ea	--	2	K	K	K	K	K	K	--	--	B-22	12
P	O		5307-023-3356	STUD: housing to cooler (76040-16AX809)	ea	--	1	*	2	2	*	2	2	6	10	B-22	8
X1	F			TUBE: water inlet (76040-673GC3115)	ea	--	1	K	K	K	K	K	K	--	--	B-22	14
X1	F			TUBE ASSEMBLY: oil inlet (76040-237GC361).	ea	--	1	K	K	K	K	K	K	--	--	B-22	22
X1	F			TUBE ASSEMBLY: oil outlet (76040-237GC418).	ea	--	1	K	K	K	K	K	K	--	--	B-22	28
P	F		6685-803-2360	UNIT: oil pressure sending (76040-64MT126).	ea	--	1	2	2	3	2	2	3	10	12	B-22	27
P	F		5310-974-7493	WASHER: 7/16 plain, water pump inlet elbow (76040-37AX9).	ea	--	2	*	*	*	*	*	*	--	--	B-22	31
P	F		5310-023-4161	WASHER: 5/16 plain, oil cooler cover (76040-37AX1).	ea	--	12	*	*	*	*	*	*	--	--	B-22	2
P	F		5310-974-7478	WASHER: 3/8 lock, oil tube (76040-36AX3).	ea	--	8	2	4	7	2	4	7	60	120	B-22	21
X1	F			WASHER: 5/16 lock, oil cooler bracket (76040-36AX22).	ea	--	3	K	K	K	K	K	K	--	--	B-22	17
P	F			BASE: oil filter (76040-766GB44A)	ea	--	1	*	*	*	*	*	*	5	*	B-23	20
X1	F			CAP: pressure valve (76040-226GB117A)	ea	--	1	K	K	K	K	K	K	--	--	B-23	24
X1	F			FILTER: assy, oil bypass (76040-435GB3151).	ea	--	1	K	K	K	K	K	K	--	--	B-23	8
				Consists of:													
X1	F			BODY: bypass filter (76040-3076-132371)	ea	--	1	K	K	K	K	K	K	--	--	B-23	13
X1	F			COVER ASSEMBLY: bypass filter (76040-3076-5241).	ea	--	1	K	K	K	K	K	K	--	--	B-23	7
				Consists of:													
X1	O			COVER: bypass filter	ea	--	1	K	K	K	K	K	K	--	--	B-23	4
P	O		2940-290-1423	GASKET: bypass filter cover (76040-121SB34).	ea	--	1	2	3	5	2	3	5	20	20	B-23	5

P	O	2940-532-9469	GASKET: bypass filter cover screw (**Gasket Set 76040-215SB76) (76040-123SB16).	ea	--	1	2	3	5	2	3	5	20	20	B-23	3
P	O	5305-021-2320	SCREW: bypass filter cover (76040-365SB19).	ea	--	1	•	2	2	•	2	2	8	10	B-23	2
X1	O	....	SPRING: bypass filter cover (76040-362SB23).	ea	--	1	K	K	K	K	K	K	--	--	B-23	6
P	O	2940-141-9026	ELEMENT: bypass filter, includes cover gasket (76040-121SB34) (96906-MS35345-1).	ea	--	1	5	9	15	5	9	15	100	200	B-23	9
P	O	5330-202-3713	GASKET: bypass case to base (**Gasket Set 76040-215SB76) (76040-123SB17).	ea	--	1	2	2	3	2	2	3	20	20	B-23	15
X1	O	....	PLATE: bypass filter holddown (76040-305SB11).	ea	--	1	K	K	K	K	K	K	--	-	B-23	12
P	O	4730-890-2370	PLUG: bypass oil drain (76040-63AX4)	ea	--	1	•	2	2	•	2	2	6	6	B-23	14
X1	O	....	SCREW: ctr holddown (76040-28SB11)	ea	--	1	K	K	K	K	K	K	--	--	B-23	11
P	O	4710-890-2567	TUBE: bypass filter ctr (76040-381SB17)	ea	--	1	•	2	2	•	2	2	6	6	B-23	10
X1	O	....	FILTER: assy, oil full flow (76040-485GB3150).	ea	--	1	K	K	K	K	K	K	--	--	B-23	35
			Consists of:													
P	O	2940-890-2558	BAR: assy, oil filter (76040-6432-6663368).	ea	--	1	•	•	•	•	•	•	4	•	B-23	1
X1	O	....	CASE AND BUSHING: assy (76040-6432-6663354).	ea	--	1	K	K	K	K	K	K	--	--	B-23	32
X1	O	....	CUP: sealing (76040-6432-6663358)	ea	--	1	K	K	K	K	K	K	--	20	B-23	30
P	O	2940-580-6283	ELEMENT: assy, oil filter with gasket (76040-6432-6664067) (96906-MS35802-3).	ea	--	1	3	6	9	3	6	9	50	100	B-23	28
P	O	2940-890-2559	GASKET: full flow case to base (76040-6432-6664067).	ea	--	1	•	2	2	•	2	2	10	30	B-23	27
X1	O	....	GASKET: bar to case (inner) (**GASKET SET 76040-215SB76) (76050-6432-666360).	ea	--	1	K	K	K	K	K	K	--	--	B-23	29
X1	O	....	GASKET: bar to case (outer) (**GASKET SET 76040-215SB76) (76040-6432-666361).	ea	--	1	K	K	K	K	K	K	--	--	B-23	34
P	O	2990-890-2563	PLATE: turbocharger warning (76040-485GB177).	ea	--	1	•	•	•	•	•	•	4	•	B-23	36
P	O	4730-919-8775	PLUG: oil fill (76040-6432-8901)	ea	--	1	•	2	2	•	2	2	6	10	B-23	33
X1	O	....	SPRING: oil filter (76040-6432-65106)	ea	--	1	K	K	K	K	K	K	--	--	B-23	31
P	F	2815-974-7557	GASKET: oil relief valve housing (**GASKET SET FSN 2815-890-2362) (76040-590GB1109B).	ea	--	1	2	2	3	2	2	3	20	40	B-23	25

(1) Source, Main. and Recov. Code (a) Source	(1) (b) Maint.	(1) (c) Recov.	(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw. (a) 1–20	(7) (b) 21–50	(7) (c) 51–100	(8) 30-Days GS Maint. Alw. (a) 1–20	(8) (b) 21–50	(8) (c) 51–100	(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration (a) Fig. No.	(11) (b) Item or Sym. No.
				0106—ENGINE LUBRICATION SYSTEM—Continued													
P	O		2815-890-6248	GASKET SET: full flow and bypass, engine lub filter (76040-215SB76). Consists of:	ea	--	1	2	3	4	2	3	4	12	24	--	--
X1	O		------------	1 GASKET: bar to case (inner) (76040-6432-666360).	--	--	K	K	K	K	K	K	K	--	--	B-23	29
X1	O		------------	1 GASKET: bar to case (outer) (76040-6432-666361).	--	--	K	K	K	K	K	K	K	--	--	B-23	34
P	O		------------	GASKET: oil relief valve housing (**GASKET SET FSN 2815-890-2362) (76040-590GB1266).	ea	--	1	2	2	3	2	2	3	20	40	B-23	25
P	O		5330-202-3713	GASKET: bypass case to base (76040-123SB17).	ea	--	1	•	•	•	•	•	•	--	--	B-23	15
P	O		2940-532-9469	GASKET: bypass filter cover screw (76040-123SB16).	ea	--	1	•	•	•	•	•	•	--	--	B-23	3
X1	F		------------	LOCK: valve cap (76040-38AX38)	ea	--	1	K	K	K	K	K	K	--	--	B-23	23
X1	F		------------	PIN: check valve (76040-183GC161)	ea	--	1	K	K	K	K	K	K	--	--	B-23	26
X1	O		------------	PLUG: 1/4 mounting base (76040-63AX45)	ea	--	1	K	K	K	K	K	K	--	--	B 23	38
X1	O		------------	PLUG: 1/8 mounting base (76040-63AX3)	ea	--	1	K	K	K	K	K	K	--	--	B-23	39
P	O		4730-890-2369	PLUG: oil drain (76040-226GB117A)	ea	--	2	2	2	2	2	2	2	12	12	B-23	18
X1	F		------------	PLUNGER: relief valve (76040-296GC121)	ea	--	1	K	K	K	K	K	K	--	--	B-23	21
X1	F		------------	SCREW: 1/2-13 x 2 base (76040-4AX289)	ea	--	4	K	K	K	K	K	K	--	--	B-23	16
X1	F		------------	SPRING: pressure relief valve (76040-572GC110).	ea	--	1	K	K	K	K	K	K	--	--	B-23	22
X1	F		------------	VALVE: check (76040-691GCA17)	ea	--	1	K	K	K	K	K	K	--	--	B-23	37
P	O		------------	WASHER: drain plug (76040-39AX1)	ea	--	2	2	2	3	2	2	3	20	30	B-23	19
X1	F		------------	WASHER: 1/2 lock, filter base (76040-36AX5).	ea	--	4	K	K	K	K	K	K	--	--	B-23	17
X1	O		------------	BRACKET: oil indicator (76040-253GC299)	ea	--	1	K	K	K	K	K	K	--	--	B-24	9
X1	O		------------	CLAMP: indicator tube (76040-83AX55)	ea	--	1	K	K	K	K	K	K	--	--	B-24	4
P	F		2815-974-7447	CRANKCASE: complete (76040-240GB5108).	ea	--	1	•	•	•	•	•	•	4	•	B-24	17
P	F		2815-974-7555	GASKET: crankcase (**GASKET SET FSN 2815-890-2362) (76040-579GB317).	ea	--	1	2	2	2	2	2	2	12	20	B-24	1

X1	O			GUIDE: oil level indicator (complete) (76040-715GB420).	ea	..	1	K	K	K	K	K	K	..	..	B-24	5
P	O		6680-890-6402	INDICATOR: oil level (complete (76040-795GBA130A).	ea	..	1	•	2	2	•	2	2	6	5	B-24	6
X1	O			NUT: indicator guide clamp (76040-20AX2).	ea	..	1	K	K	K	K	K	K	..	..	B-24	2
X1	O			NUT: indicator guide (76040-63AX355)	ea	..	1	K	K	K	K	K	K	..	..	B-24	11
P	O		4730-974-7451	PLUG: crankcase drain (76040-261GC15)	ea	..	2	•	•	•	•	•	•	5	•	B-24	13
X1	O			SCREW: 5/16-24 NF x 3/4 bracket (76040-1AX110).	ea	..	1	K	K	K	K	K	K	..	..	B-24	7
X1	F			SCREW: 5/16-18 NC x 3/4 clamp (76040-4AX99).	ea	..	21	K	K	K	K	K	K	..	..	B-24	10
P	F		5305-983-7460	SCREW: 1/2-13 NC x 1 (crankcase front) (socket head) (76040-6AX489).	ea	..	2	2	2	2	2	2	2	12	20	B-24	20
P	F		5305-044-4153	SCREW: 1/2-13 NC x 1 (crankcase rear) (hex hd) (76040-4AX24).	ea	..	2	2	2	2	2	2	2	12	20	B-24	16
P	F		5305-069-3210	SCREW: 3/8-16 NC x 7/8 (crankcase side) (76040-4AX58).	ea	..	26	5	10	18	5	10	18	156	260	B-24	18
X1	F			SLEEVE: indicator (76040-52AX5)	ea	..	1	K	K	K	K	K	K	..	..	B-24	12
P	O		5310-333-7450	WASHER: drain plug (76040-39AX23)	ea	..	2	2	2	3	2	2	3	20	20	B-24	14
P	F		5310-974-7478	WASHER: 3/8 lock, crankcase side (76040-36AX3).	ea	..	26	5	10	18	5	10	18	156	260	B-24	19
P	F		5310-023-4374	WASHER: 1/2 lock, crankcase front and rear (76040-36AX5).	ea	..	4	2	2	3	2	2	3	20	40	B-24	15
X1	F			WASHER: 5/16 lock, guide bracket (76040-36AX22).	ea	..	1	K	K	K	K	K	K	..	..	B-24	8
X1	F			WASHER: 5/16 lock, heavy, clamp (76040-36AX2).	ea	..	1	K	K	K	K	K	K	..	..	B-24	3
X1	F			BRACE: screen shield (76040-639GC329)	ea	..	1	K	K	K	K	K	K	..	..	B-25	37
X1	F			BRACKET: inlet and outlet tube (76040-253GC297).	ea	..	1	K	K	K	K	K	K	..	..	B-25	26
X1	F			BRACKET: tube to rear bracket (76040-180GB132).	ea	..	1	K	K	K	K	K	K	..	..	B-25	38
X1	F			BRACKET: screen shield (76040-636GC328).	ea	..	1	K	K	K	K	K	K	..	..	B-25	12
X1	F			CAP: safety valve (76040-226GB126)	ea	..	1	K	K	K	K	K	K	..	..	B-25	36
X1	F			CLAMP: oil inlet tube (76040-83AX275)	ea	..	1	K	K	K	K	K	K	..	..	B-25	9
X1	F			CLAMP: outlet tube (2 tubes) (76040-18GB134).	ea	..	1	K	K	K	K	K	K	..	..	B-25	21
X1	F			FITTING: oil screen shield (76040-497GB1147).	ea	..	1	K	K	K	K	K	K	..	..	B-25	15

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0106—ENGINE LUBRICATION SYSTEM—Continued													
X1	H		....	GASKET: oil pump pickup screen (**GASKET SET FSN 2815–890–2362) (76040–590GB245).	ea	--	1	--	--	--	K	K	K	--	--	B–25	13
X1	H		....	GASKET: scavenger pump outlet tube (**GASKET SET FSN 2815–890–2362) (76040–56AX1246).	ea	--	1	--	--	--	K	K	K	--	--	B–25	6
P	F		2815–890–2352	GASKET: main oil pump inlet and outlet tubes (**GASKET SET FSN 2815–890–2362) (76040–590GB1210).	ea	--	2	2	2	3	2	2	3	16	30	B–25	7
X1	H		....	GASKET: scavenger pump outlet tube (**GASKET SET FSN 2815–890–2362) (76040–590GB1246).	ea	--	1	--	--	--	K	K	K	--	--	B–25	23
X1	F		....	GASKET: oil pressure relief valve housing (**GASKET SET FSN 2815–890–2362) (76040–590GB1122A).	ea	--	1	K	K	K	K	K	K	--	--	B–25	10
P	O		2815–890–2350	GASKET: rear sump outlet tube (**GASKET SET FSN 2815–890–2362) (76040–590GB1234).	ea	--	1	*	2	2	*	2	2	8	30	B–25	28
X1	F		....	HOUSING: safety valve (76040–766GB28) ..	ea	--	1	K	K	K	K	K	K	--	--	B–25	29
P	F		5315–699–8377	KEY: pump to main brg cap (76040–42AX274).	ea	--	2	2	2	2	2	2	2	12	24	B–25	1
X1	F		....	LOCK: safety valve cap (76040–87GC127) ..	ea	--	11	K	K	K	K	K	K	--	--	B–25	35
X1	F		....	NUT: 1/4-28 NF castle, clamp (76040–19AX1).	ea	--	3	K	K	K	K	K	K	--	--	B–25	19
X1	F		....	PIN: 1/16 cotter, clamp nut (76040–29AX1) .	ea	--	3	K	K	K	K	K	K	--	--	B–25	20
X1	F		....	PLUNGER: safety valve (76040–296GC121).	ea	--	1	K	K	K	K	K	K	--	--	B–25	33
P	F	R	2815–974–7464	PUMP: assy, oil (see fig. 26 for details) (76040–315GCA373) (for engine FSN 2815–980–7092 and FSN 2815–087–2273).	ea	--	1	*	*	*	*	*	*	4	*	B–25	2
X1	F		....	SCREEN: rear sump (76040–388GC214)	ea	--	1	K	K	K	K	K	K	--	--	B–25	17
P	F		5305–021–1968	SCREW: 7/16–14 NC x 1 1/8 drilled head, (76040–6AX450).	ea	--	5	2	3	5	2	3	5	30	60	B–25	11
P	F		5305–021–1812	SCREW: 5/16–18 NC x 3/4 drilled head, oil pump to bracket (76040–6AX1151).	ea	--	4	2	2	3	2	2	3	24	50	B–25	39

P	F		5305-021-1716	SCREW: 1/4-20 NC x 5/8 drilled head, shield (76040-6AX1146).	ea	--	2	2	2	2	2	2	2	12	24	B-25	16
P	F		5305-935-7582	SCREW: 1/4-28 NF x 3/4 drilled head, clamp (76040-2AX25).	ea	--	3	2	2	3	2	2	3	18	30	B-25	23
P	F	R	....	PUMP: assy, oil (for engine FSN 2815-045-6865) (76040-315GCA3101).	ea	--	1	•	•	•	•	•	•	4	•	--	--
P	F		5305-021-1843	SCREW: 7/16-14 NC x 15/16 drilled head, clamp bracket (76040-6AX449).	ea	--	1	•	2	2	•	2	2	6	10	B-25	27
P	F		5305-569-8840	SCREW: 7/16-14 NC x 2 7/8 drilled head, safety valve (76040-6AX441).	ea	--	1	•	2	2	•	2	2	6	10	B-25	31
P	F		5305-021-1297	SCREW: 3/8-24 NF x 1, tube to safety valve (76040-3AX758).	ea	--	1	•	2	2	•	2	2	6	10	B-25	30
P	F		5305-021-2276	SCREW: 3/8-16 NC x 15/8, drilled head, scavenger outlet tube (76040-6AX96).	ea	--	1	•	2	2	•	2	2	6	10	B-25	24
P	F		5305-569-8846	SCREW: 3/8-16 NC x 3/4 (76040-6AX273)	ea	--	9	2	4	7	2	4	7	60	100	B-25	5
X1	H		....	SEAL: tube to safety valve, preformed packing (**GASKET SET FSN 2815-890-2362) (76040-466GC196).	ea	--	1	--	--	--	K	K	K	--	10	B-25	32
X1	H		....	SHIELD: oil screen (76040-492GC236)	ea	--	1	--	--	--	K	K	K	--	--	B-25	14
X1	F		....	SPRING: safety valve (76040-572GC121)	ea	--	1	K	K	K	K	K	K	--	--	B-25	34
P	F		4710-890-2565	TUBE: assy, scavenger pump inlet (76040-211GC115).	ea	--	1	•	2	2	•	2	2	8	8	B-25	3
P	F		4710-890-2566	TUBE: assy, scavenger pump outlet (76040-211GC56).	ea	--	1	•	2	2	•	2	2	8	8	B-25	18
P	F		4710-890-2569	TUBE: assy, main oil pump outlet (76040-210GC411).	ea	--	1	•	2	2	•	2	2	6	6	B-25	25
P	F		4710-890-2568	TUBE: assy, main oil pump inlet (76040-211GC419).	ea	--	1	•	2	2	•	2	2	6	6	B-25	8
P	F		5310-023-4264	WASHER: 1/4, oil tube to screen fitting (76040-711GC168).	ea	--	2	•	2	2	•	2	2	10	20	B-25	40
X1	F		....	WIRE: lock, soft (76040-234AX8)	--	--		K	K	K	K	K	K	--	--	B-25	4
X1	F		....	COVER: oil pump housing 76040-350GB231).	ea	--	1	K	K	K	K	K	K	--	--	B-26	14
P	F		2815-974-7597	GEAR: idler, oil pump (76040-677GBA19A)	ea	--	1	•	•	•	•	•	•	4	•	B-26	5
P	F		2815-974-7601	GEAR: drive, oil pump (76040-683GB1117A).	ea	--	1	•	•	•	•	•	•	4	•	B-26	4
X1	F		....	GEAR: driven, oil pump (76040-683GB178)	ea	--	1	K	K	K	K	K	K	--	--	B-26	13
X1	F		....	GEAR: idler (with bushing) (76040-683GB176).	ea	--	2	K	K	K	K	K	K	--	--	B-26	16
X1	F		....	HOUSING: assy, oil pump (76040-767GBA233) (for engine FSN 2815-980-7092 and FSN 2815-067-2273).	ea	--	1	K	K	K	K	K	K	--	--	B-26	7
X1	F		....	HOUSING: main oil pump (76040-767GB337).	ea	--	1	K	K	K	K	K	K	--	--	B-26	12

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1-20	(b) 21-50	(c) 51-100	(a) 1-20	(b) 21-50	(c) 51-100			(a) Fig. No.	(b) Item or Sym. No.
				0106—ENGINE LUBRICATION SYSTEM—Continued													
P	F		5315-023-2586	KEY: driving gear (76040-42AX360)	ea	--	1	*	2	2	*	2	2	6	10	B-26	2
X1	F		....	HOUSING: assy, oil pump (for engine FSN 2815-045-6865) (76040-767GBA241).	ea	--	1	K	K	K	K	K	K	--	--	--	--
P	F		5310-023-2742	NUT: gear retainer (76040-21AX79)	ea	--	1	*	2	2	*	2	2	6	12	B-26	1
X1	F		....	PIN: 3/32 x 1 1/4 cotter (76040-29AX4)	ea	--	1	K	K	K	K	K	K	--	--	B-26	3
X1	F		....	PIN: 3/32 x 1 cotter (76040-29AX3)	ea	--	1	K	K	K	K	K	K	--	--	B-26	5
X1	F		....	PIN: locating, cover (76040-31AX532)	ea	--	2	K	K	K	K	K	K	--	--	B-26	11
X1	F		....	SCREW: 3/8-16 x 2 3/4 cover (76040-6AX1163).	ea	--	4	K	K	K	K	K	K	--	--	B-26	15
X1	F		....	SCREW: idler gear (76040-435GC16)	ea	--	1	K	K	K	K	K	K	--	--	B-26	8
X1	F		....	SCREW: set (76040-259GC144)	ea	--	1	K	K	K	K	K	K	--	--	B-26	10
X1	F		....	SHAFT ASSEMBLY: idler (76040-464GCA141).	ea	--	1	K	K	K	K	K	K	--	--	B-26	17
X1	F		....	SHAFT: driving, oil pump (76040-465GC225).	ea	--	1	K	K	K	K	K	K	--	--	B-26	9
P	O		2815-974-7551	GASKET: exhaust manifold, ctr (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-573GB144).	ea	--	2	2	2	3	2	2	3	20	20	B-27	4
P	O		2815-974-7542	GASKET: exhaust manifold, end (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-560GB12A).	ea	--	4	2	3	6	2	3	6	40	40	B-27	6
P	O		2815-974-7405	MANIFOLD: exhaust, ctr (76040-104GC4242).	ea	--	1	*	2	2	*	2	2	6	10	B-27	3
P	O		2815-974-7404	MANIFOLD: exhaust, front (76040-104GC367).	ea	--	1	*	2	2	*	2	2	6	10	B-27	5
P	O		2815-974-7403	MANIFOLD: exhaust, rear (76040-104GC366).	ea	--	1	*	2	2	*	2	2	6	10	B-27	1
P	O		5310-974-7444	NUT: manifold (76040-23AX395)	ea	--	12	2	4	8	2	4	8	72	120	B-27	8
P	O		2990-890-2564	RING: exhaust sealing (76040-349GC10406).	ea	--	6	3	5	10	3	5	10	80	160	B-27	2
P	O		5307-023-3746	STUD: 7/16-14 NC turbocharger (76040-17AX89).	ea	--	2	2	2	3	2	2	3	20	30	B-27	9
P	O		5310-736-1819	WASHER: manifold (76040-37AX256)	ea	--	12	2	4	8	2	4	8	72	120	B-27	7

P	O	2815-974-7550	GASKET: intake manifold (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-573GB135).	ea	--	6	2	4	7	2	4	7	60	140	B-28	1
P	O	2815-974-7406	MANIFOLD: intake (76040-105GC4187)	ea	--	1	•	•	•	•	•	•	4	•	B-28	2
X1	O	------------	PLUG: 1/8 sq hd NPT (76040-63AX3)	ea	--	2	K	K	K	K	K	K	--	--	B-28	3
P	O	5305-069-5578	SCREW: 7/16-14 NC x 1 (76040-4AX27)	ea	--	12	2	4	8	2	4	8	72	120	B-28	5
P	O	5310-023-4004	WASHER: 7/16 lock (76040-36AX4)	ea	--	12	2	4	8	2	4	8	72	120	B-28	4
			0109—ACCESSORY DRIVING MECHANISMS													
P	H	3110-156-4684	BEARING: injection pump drive, front (76040-46AX313).	ea	--	1	--	--	--	•	2	2	6	10	B-29	12
P	H	3110-144-8511	BEARING: injection pump drive, rear (76040-46AX314).	ea	--	1	--	--	--	•	•	•	4	•	B-29	18
X1	F	------------	COUPLING: driven (76040-320GB169B)	ea	--	1	K	K	K	K	K	K	--	--	B-29	23
P	F	2815-974-7603	GEAR: set (76040-688GBA135A)	ea	--	1	•	•	•	•	•	•	4	•	B-29	2
			Consists of:													
X1	F	------------	1 GEAR: driving (76040-678GB229A)	--	--	--	K	K	K	K	K	K	--	--	B-29	2.1
X1	F	------------	1 GEAR: driven (76040-678GB227A)	--	--	--	K	K	K	K	K	K	--	--	B-29	2.2
X1	H	------------	HOUSING: injection pump drive (for Engine FSN 2815-980-7092) (76040-763GB23C).	ea	--	1	--	--	--	K	K	K	--	--	B-29	16
X1	H	------------	HOUSING: injection pump drive (for Engine FSN 2815-087-2273 and FSN 76040-763GB213) 2815-045-6865).	ea	--	1	--	--	--	K	K	K	--	--	B-29	16
X1	H	------------	HUB: driven gear (76040-791GB23A)	ea	--	1	--	--	--	K	K	K	--	--	B-29	10
P	F	5315-974-7504	KEY: driven gear (76040-42AX618)	ea	--	1	•	2	2	•	2	2	6	10	B-29	9
P	F	5315-694-8367	KEY: drive gear (76040-42AX214)	ea	--	1	•	2	2	•	2	2	6	10	B-29	1
P	F	5310-023-2741	NUT: hub to shaft (76040-142GC145)	ea	--	1	•	2	2	•	2	2	6	10	B-29	8
P	H	5310-974-7416	NUT: brg retainer (76040-128GC11)	ea	--	1	--	--	--	•	2	2	6	10	B-29	11
P	H	5310-974-7421	NUT: injection pump coupling (76040-143GC12).	ea	--	1	--	--	--	•	•	•	4	•	B-29	21
X1	H	------------	PIN: 3/32 x 1/2 cotter, retainer nut (76040-29AX11).	ea	--	1	--	--	--	K	K	K	--	--	B-29	13
P	H	5305-974-7461	SCREW: 3/8-24 x 1 1/8 special lockscrew (76040-3AX1305).	ea	--	4	--	--	--	2	2	3	20	40	B-29	7
P	H	5305-974-7508	SCREW: coupling lock (76040-434GC11)	ea	--	1	--	--	--	•	2	2	8	10	B-29	20
P	H	5305-974-7459	SCREW: 3/8-24 NF x 1.469 drive gear (76040-3AX1112).	ea	--	4	--	--	--	2	2	3	20	40	B-29	4
P	H	5305-021-2268	SCREW: 3/8-16 NC x 3/4 drive housing (76040-6AX847).	ea	--	3	--	--	--	2	2	2	12	30	B-29	14
P	H	2910-974-7521	SHAFT: injection pump drive (76040-461GC217B).	ea	--	1	--	--	--	•	•	•	4	•	B-29	19

(1) Source, Main. and Recov. Code			(2)	(3)	(4)	(5)	(6)	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9)	(10)	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.	Federal Stock Number	Description	Unit of Issue	Qty Inc in Unit Pack	Qty Inc in Unit	(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100	1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	Depot Maint. Alw. Per 100 Equip.	(a) Fig. No.	(b) Item or Sym. No.
				0109—ACCESSORY DRIVING MECHANISMS—Continued													
P	H		5340–020–6932	SPACER: injection pump drive brg (76040–537GC111A).	ea	--	1	--	--	--	*	2	2	6	10	B–29	17
P	H		5305–974–7472	WASHER: hardened, driving gear (76040–35AX1197).	ea	--	4	--	--	--	2	2	2	12	40	B–29	8
P	H		5310–023–4227	WASHER: plain, driven gear (76040–37AX441).	ea	--	4	--	--	--	2	2	3	24	40	B–29	6
P	H		5310–974–7478	WASHER: 3/8 id lock, drive housing (76040–36AX3).	ea	--	3	--	--	--	2	3	5	30	60	B–29	15
P	H		5310–974–7622	WASHER: coupling lock (76040–733GC16)	ea	--	1	--	--	--	*	2	2	8	10	B–29	22
X1	H		-------------	WIRE: lock, soft (76040–234AX9)	--	--	--	--	--	--	K	K	K	--	--	B–29	5
P	H		3110–732–6374	BEARING: aux drive, front (76040–61GB14B).	ea	--	1	--	--	--	*	*	*	4	*	B–30	13
P	H		3110–732–6375	BEARING: aux drive, rear (76040–61GB15C).	ea	--	1	--	--	--	*	*	*	4	*	B–30	15
X1	H		-------------	COUPLING: air compressor drive (76040–320GBA180).	ea	--	1	--	--	--	K	K	K	--	--	B–30	22
P	F		6680–890–6401	DRIVE ASSEMBLY: tachometer (76040–769GBA114).	ea	--	1	*	2	2	*	2	2	6	10	B–30	5
				Consists of:													
X1	F		-------------	1—GEAR: tachometer drive (76040–685GB11).	--	--	--	K	K	K	K	K	K	--	--	B–30	6
X1	F		-------------	1—HOUSING: tachometer drive (76040–769GB23).	--	--	--	K	K	K	K	K	K	--	--	B–30	4
X1	F		-------------	1—PIN: tachometer gear (76040–31AX13).	--	--	--	K	K	K	K	K	K	--	--	B–30	7
X1	F		-------------	1—SHAFT: tachometer drive (76040–465GC111).	--	--	--	K	K	K	K	K	K	--	--	B–30	3
P	F		2920–733–0779	GASKET: tachometer drive housing (**GASKET SET FSN 2815–890–2362) (76040–598GB11A).	ea	--	1	*	2	2	*	2	2	10	100	B–30	8
X1	F		-------------	GEAR: oil pump (used as spacer) (76040–682GB113).	ea	--	1	K	K	K	K	K	K	--	10	B–30	21
P	H		2815–974–7601	GEAR SET: engine timing (76040–688GBA112C).	ea	--	1	--	--	--	*	*	*	4	*	--	--

				Consists of:											
X1	H		....	1 GEAR: auxiliary shaft (76040-667GB21B).	--	--	--	--	--	--	K	K	K	--	--	B-30	11
X1	H		....	1 GEAR: camshaft (76040-688GB213C) ..	--	--	--	--	--	--	K	K	K	--	--	B-20	12
X1	H		....	1 GEAR: crankshaft (76040-670GB213C) .	--	--	--	--	--	--	K	K	K	--	--	B-12	10
P	H		5315-699-8364	KEY: air compressor drive coupling, inner (76040-42AX167).	ea	--	1	--	--	--	*	2	2	6	10	B-30	17
P	F		5315-693-0071	KEY: air compressor drive coupling, outer (76040-42AX336).	ea	--	1	*	2	2	*	2	2	6	10	B-30	20
P	F		5315-699-8367	KEY: aux gear (76040-42AX214)	ea	--	1	*	2	2	*	2	2	10	10	B-30	12
P	H		2815-733-2292	LOCK: air compressor coupling nut (76040-83GC11).	ea	--	1	--	--	--	*	2	2	6	10	B-30	23
X1	H		....	NUT: aux shaft (76040-20AX21)	ea	--	1	--	--	--	K	K	K	--	--	B-30	24
X1	H		....	PIN: thrust washer (76040-32AX65)	ea	--	1	--	--	--	K	K	K	--	--	B-30	16
X1	F		....	SCREW: 1/4-20 NC x 3/4 tachometer (76040-4AX2).	ea	--	2	K	K	K	K	K	K	--	--	B-30	1
X1	H		....	SCREW: 3/8-24 NC x 1.469 aux drive shaft (76040-3AX1112).	ea	--	4	--	--	--	K	K	K	--	--	B-30	9
X1	H		....	SHAFT: aux drive (76040-453GC25)	ea	--	1	--	--	--	K	K	K	--	--	B-30	14
X1	F		....	TUBE: air compressor oil feed (76040-201GC110).	ea	--	1	K	K	K	K	K	K	--	--	B-30	19
P	H		5310-974-7616	WASHER: aux shaft thrust (76040-701GC11A).	ea	--	1	--	--	--	*	2	2	8	10	B-30	18
X1	F		....	WASHER: tachometer housing (76040-37AX5).	ea	--	2	K	K	K	K	K	K	--	--	B-30	2
X1	F		....	WIRE: lock, soft (76040-234AX15)	--	--	--	K	K	K	K	K	K	--	--	B-30	10
				GROUP 02—CLUTCH **0200—CLUTCH ASSEMBLY**													
P	F		3110-144-8637	BEARING: clutch pilot (700070)	ea	--	1	*	2	2	*	2	2	10	10	B-31	1
P	F		2520-097-3197	DISK CLUTCH: assy (77873-5-7905-2) ...	ea	--	1	2	3	5	2	3	5	20	50	B-31	2
P	F	R	2520-097-4152	PLATE: pressure, w/cover, assy (see fig. B-32 for details) (31007-165591R91).	ea	--	1	*	2	2	*	2	2	10	10	B-31	3
X1	F		....	SCREW: pressure plate (96906-35289-66) ..	ea	--	10	K	K	K	K	K	K	--	--	B-31	5
X1	F		....	WASHER: pressure plate (7003999)	ea	--	10	K	K	K	K	K	K	--	--	B-31	4
P	H		3110-112-5774	BEARING: needle, release lever (709487) ...	ea	--	6	--	--	--	2	4	8	72	72	B-32	19
X1	H		....	BOLT: shipping (7974809)	ea	--	3	--	--	--	K	K	K	--	--	B-32	7
P	H		2520-506-4855	KIT: pressure plate repair (31007-165591R91).	ea	--	1	--	--	--	2	2	3	20	40	--	--
				Composed of:													
X1	H		....	3—ADJUSTING NUT: (77873-CL6825) ..	--	--	--	--	--	--	K	K	K	--	--	B-32	9

(1) Source, Maint. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0200—CLUTCH ASSEMBLY—Continued													
X1	H			3—ADJUSTING NUT WASHER: (77873–CL6824).	--	--	--	--	--	--	K	K	K	--	--	B–32	10
X1	H			3—ANTIRATTLE SPRING: 77873–CL9650).	--	--	--	--	--	--	K	K	K	--	--	B–32	11
X1	H			3—COTTER PIN: (103384)	--	--	--	--	--	--	K	K	K	--	--	B–32	20
X1	H			21—INSULATING WASHER: (77873–CL8941–1).	--	--	--	--	--	--	K	K	K	--	--	B–32	3
X1	H			3—LEVER: assy (7974312)	--	--	--	--	--	--	K	K	K	--	--	B–32	12
				Consists of:													
X1	H			3—LEVER: (77873–CL6412)	--	--	--	--	--	--	K	K	K	--	--	B–32	16
X1	H			3—EYEBOLT ASSEMBLY: (77873–UCL9761).	--	--	--	--	--	--	K	K	K	--	--	B–32	18
				Consists of:													
X1	H			3—BEARING: needle, eyebolt (709503).	--	--	--	--	--	--	K	K	K	--	--	B–32	15
X1	H			3—EYEBOLT: (77873–UCL9760)	--	--	--	--	--	--	K	K	K	--	--	B–32	17
X1	H			3—PIVOT PIN: (77873–CL6280)	--	--	--	--	--	--	K	K	K	--	--	B–32	14
X1	H			3—LEVER PIN: (77873–CL6283)	--	--	--	--	--	--	K	K	K	--	--	B–32	18
X1	H			3—LOCKNUT (77873–CL9219)	--	--	--	--	--	--	K	K	K	--	--	B–32	8
X1	H			1—PLATE: pressure, cover (7648736)	--	--	--	--	--	--	K	K	K	--	--	B–32	5
X1	H			1—PLATE: pressure, (7003995)	--	--	--	--	--	--	K	K	K	--	--	B–32	1
X1	H			21—PRESSURE SPRING: (77873–CL6615–12A).	--	--	--	--	--	--	K	K	K	--	--	B–32	4
X1	H			21—RETAINING WASHER: (77873–CL8942).	--	--	--	--	--	--	K	K	K	--	--	B–32	2
X1	H			3—WASHER: (106263)	--	--	--	--	--	--	K	K	K	--	--	B–32	21
X1	H			WASHER: shipping bolt (7003999)	ea	--	3	--	--	--	K	K	K	--	--	B–32	6
				GROUP 03—1 FUEL SYSTEM 0301—FUEL INJECTOR													
P	F		5310–974–7559	GASKET: nozzle holder, inner (**GASKET SETS FSN 2815–390–2362 and 2815–390–2848) (76040–590GB1127).	ea	--	6	2	4	7	2	4	7	60	200	B–33	7

P	F	2910-974-7614	GASKET: retaining screw (76040-711GC192).	ea	--	18	3	6	11	3	6	11	90	180	B-33	15
P	F	2910-974-7623	HOLDER, NOZZLE ASSEMBLY: fuel injector (76040-736GB221).	ea	--	6	*	*	*	*	*	*	--	--	B-33	1
			Consists of:													
X1	F	------------	1 BODY: nozzle holder (76040-21SB39)	--	--	--	K	K	K	K	K	K	--	--	B-33	3
X1	F	------------	1 COVER: protection (76040-42SB71)	--	--	--	K	K	K	K	K	K	--	--	B-33	14
P	H	2910-974-7570	GASKET: protection cover (76040-121SB21).	ea	--	1	--	--	--	2	3	5	30	60	B-33	13
X1	F	------------	1—LOCKNUT: pressure adjusting (76040-261SZ275).	--	--	--	K	K	K	K	K	K	--	--	B-33	12
X1	F	------------	1—NUT: spring retaining (76040-261SB34).	--	--	--	K	K	K	K	K	K	--	--	B-33	11
X1	F	------------	1—NUT: nozzle cap (76040-261SB33)	--	--	--	K	K	K	K	K	K	--	--	B-33	6
X1	F	------------	2—PIN: locating (76040-311SB39)	--	--	--	K	K	K	K	K	K	--	--	B-33	4
X1	F	------------	1—SCREW: pressure adjusting (76040-365SB89).	--	--	--	K	K	K	K	K	K	--	--	B-33	10
X1	F	------------	1 SPINDLE ASSEMBLY: (76040-380SB24).	--	--	--	K	K	K	K	K	K	--	--	B-33	8
X1	F	------------	1 SPRING: pressure adjusting (76040-362SB98).	--	--	--	K	K	K	K	K	K	--	--	B-33	9
P	F	2910-974-7409	NOZZLE: (76040-114GC21P1)	ea	--	6	2	4	6	2	4	6	24	48	B-33	5
P	O	5305-974-7503	SCREW: retaining (76040-425GC16)	ea	--	6	2	2	3	2	2	3	20	60	B-33	2
			0303—FUEL PUMPS													
P	H	2910-890-2523	GASKET SET: injection pump (**Overhaul Kit 76040-215SB49) (76040-209SB16).	ea	--	1	--	--	--	2	3	4	12	48	--	--
			Consists of:													
X1	H	------------	12 GASKET: barrel locating screw (6), tappet guide screw (6) (76040-122SB98).	--	--	--	--	--	--	K	K	K	--	--	B-36	18
X1	H	------------	6 GASKET: base plug (76040-122SB99)	--	--	--	--	--	--	K	K	K	--	--	B-36	25
X1	H	------------	2 GASKET: ctr brg screw (76040-122SB106).	--	--	--	--	--	--	K	K	K	--	--	B-37	17
P	H	2910-974-7415	6 GASKET: delivery valve (76040-122SB94).	--	--	--	--	--	--	*	*	*	--	--	B-37	8
X1	H	------------	1 GASKET: inspection cover (76040-122SB101).	--	--	--	--	--	--	K	K	K	--	--	B-36	27
X1	H	------------	1 GASKET: supply pump (76040-122SB102).	--	--	--	--	--	--	K	K	K	--	--	B-34	28
P	H	2910-890-2506	KIT, OVERHAUL: injection pump (76040-215SB49).	ea	--	1	--	--	--	2	3	4	12	48	--	--

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0302—FUEL PUMPS—Continued													
				Consists of:													
X1	H		------------	1 BAFFLE: oil (76040-40SB11)	--	--	--	--	--	--	K	K	K	--	--	B–36	2
P	H		4910-977-7408	6 CAPS: protection (76040-17-T-1549A)	--	--	--	--	--	--	*	--	--	--	--	2–3	2
X1	H		------------	1 GASKET: baffle plate (76040-122SB107).	--	--	--	--	--	--	K	K	K	--	--	B–36	3
P	H		2910-890-2523	1 GASKET SET: (non-illustrated) (76040-209SB16).	--	--	--	--	--	--	*	*	*	--	--	--	--
X1	H		------------	1 KEY: camshaft (76040-201SZ73)	--	--	--	--	--	--	K	K	K	--	--	B–36	24
X1	H		------------	3 NUT: supply pump (76040-261SZ247)	--	--	--	--	--	--	K	K	K	--	--	B–34	31
X1	H		------------	6 SCREW: barrel locating (76040-361SZ280).	--	--	--	--	--	--	K	K	K	--	--	B–36	33
X1	H		------------	2 SCREW: oil baffle (76040-368SZ31)	--	--	--	--	--	--	K	K	K	--	--	B–36	1
X1	H		------------	1 SCREW: rack stop (76040-361SZ278)	--	--	--	--	--	--	K	K	K	--	--	B–36	12
X1	H		------------	4 SCREW: rear brg plate (76040-361SZ388).	--	--	--	--	--	--	K	K	K	--	--	B–37	1
X1	H		------------	6 SCREW: tappet guide (76040-361SZ279).	--	--	--	--	--	--	K	K	K	--	--	B–36	14
X1	H		------------	1 SEAL: shutoff lever (76040-384SZ161)	--	--	--	--	--	--	K	K	K	--	--	B–36	37
X1	H		------------	9 WASHER: inspection cover (76040-441SZ379).	--	--	--	--	--	--	K	K	K	--	--	B–36	29
X1	H		------------	4 WASHER: rear brg plate (76040-441SZ310).	--	--	--	--	--	--	K	K	K	--	--	B–37	2
X1	H		------------	3 WASHER: supply pump lock (76040-441SZ365).	--	--	--	--	--	--	K	K	K	--	--	B–34	30
P	H		2910-890-2531	SHIM SET: injection pump (19207-5704267).	ea	--	1	--	--	--	*	2	2	10	10	--	--
				Consists of:													
--	--		------------	SHIM: camshaft adjusting	--	--	--	--	--	--	--	--	--	--	--	B–37	4
X1	H		------------	1—.002 (76040-375SB21P6)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		------------	1—.004 (76040-375SB21P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		------------	1—.006 (76040-375SB21P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		------------	1—.008 (76040-375SB21P1)	--	--	--	--	--	--	K	K	K	--	--	--	--

X1	H		--------	1—.012 (76040-375SB21P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.016 (76040-375SB21P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
..	..		--------	SHIM: rack adjusting	--	--	--	--	--	--	--	--	--	--	--	B-36	16
X1	H		--------	1—.002 (76040-375SB18P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.003 (76040-375SB18P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.004 (76040-375SB18P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.010 (76040-375SB18P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.020 (76040-375SB18P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.040 (76040-375SB18P6)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.094 (76040-375SB18P7)	--	--	--	--	--	--	K	K	K	--	--	--	--
..	..		--------	SHIM: tappet	--	--	--	--	--	--	K	..	..	--	--	B-37	26
X1	H		--------	1—.050 (76040-366SB15P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.054 (76040-366SB15P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.058 (76040-366SB15P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.062 (76040-366SB15P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		--------	1—.066 (76040-366SB15P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
XI	F		--------	BRACKET: inlet tube 3 and 4, w/insulator (76040-253GCA1220).	ea	--	1	K	K	K	K	K	K	--	--	B-34	20
X1	F		--------	BRACKET: inlet tube 5 and 6, w/insulator (76040-253GCA1118A).	ea	--	1	K	K	K	K	K	K	--	--	B-34	19
P	F		4730-890-2385	CLAMP: inlet tube (76040-83AX582)	ea	--	1	*	*	2	*	*	2	6	10	B-34	47
P	F		4730-890-2384	CLAMP: inlet tube (76040-83AX655)	ea	--	1	*	*	2	*	*	2	6	10	B-34	46
X1	F		--------	CLAMP: inlet tube 3, 4, 5 and 6 (76040-253GC1238).	ea	--	2	K	K	K	K	K	K	--	--	B-34	34
P	O		--------	CONNECTOR: air vent hose (76040-63AX-329).	ea	--	1	*	2	2	*	2	2	6	10	B-34	12
X1	F		--------	CONNECTOR: nozzle (76040-308GB15)	ea	--	10	K	K	K	K	K	K	--	--	B-34	1
X1	F		--------	CONNECTOR: nozzle (76040-308GB118)	ea	--	1	K	K	K	K	K	K	--	--	B-34	11
P	O		4730-974-7586	ELBOW: fuel filter inlet hose (76040-63AX-305).	ea	--	2	*	2	2	*	2	2	10	20	B-34	25
P	F		4730-974-7591	ELBOW: overflow valve test (76040-63AX889).	ea	--	1	*	2	2	*	2	2	6	10	B-34	56
P	O		4730-974-7586	ELBOW: lube oil feed at pump (76040-63AX3059).	ea	--	1	*	2	2	*	2	2	6	10	B-34	32
P	O		2910-890-2517	ELBOW: fuel filter air bleed (76040-63AX330).	ea	--	1	*	2	2	*	2	2	6	10	B-34	26
X1	H		--------	GASKET: supply pump (**Gasket Set 76040-209SB16) (76040-122SB102).	ea	--	1	--	--	--	K	K	K	--	--	B-34	28
P	O		2910-974-7560	GASKET: nozzle holder, outer (**GASKET SETS FSN 2815-890-2362 and FSN 2815-890-2348) (76040-590GB1143) (for engine 2815-980-7092 and 2815-087-2273).	ea	--	6	2	4	7	2	4	7	60	300	B-34	36
P	F		2910-974-7482	HOSE: assy, rubber, oil feed (76040-36RUA3117P24).	ea	--	1	*	2	2	*	2	2	6	10	B-34	33

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0302—FUEL PUMPS—Continued													
P	F		2910-890-2538	HOSE: fuel filter air bleed (76040-36RUA3117P12).	ea	--	1	*	2	2	*	2	2	6	10	B-34	16
P	F		2910-974-7486	HOSE: filter to fuel emergency shutoff valve (76040-36RUA3132P9).	ea	--	1	*	2	2	*	2	2	10	10	B-34	27
P	F		2910-974-7487	HOSE: filter to primer pump (76040-36RUA3132P44).	ea	--	1	*	2	2	*	2	2	10	10	B-34	51
X1	F		....	INSULATOR: inlet tube (76040-270GB14)	ea	--	6	K	K	K	K	K	K	--	--	B-34	18
X1	F		....	INSULATOR: inlet tube (76040-41GC114).	ea	--	4	K	K	K	K	K	K	--	--	B-34	35
P	O		....	GASKET: nozzle holder, outer (for engine FSN 2815-045-6865) (76040-449GC120).	ea	--	6	2	3	5	2	3	5	30	100	B-34	36
P	O		4730-890-2381	NIPPLE: overflow valve test 1/4 NPT (76040-63AX929).	ea	--	1	*	2	2	*	2	2	6	10	B-34	53
P	F		2910-974-7623	NOZZLE: holder, fuel injection (for details see fig. B-33) (76040-736GB221).	ea	--	6	2	2	3	2	2	3	24	60	B-34	37
P	F		5310-974-7427	NUT: 3/8-24 NF nozzle holder (76040-20AX3).	ea	--	12	2	4	8	2	4	8	72	120	B-34	38
P	O		5310-974-7420	NUT: 1/4 compression, overflow tube (76040-63AX363).	ea	--	6	2	2	3	2	2	3	20	40	B-34	2
P	O		4730-142-2178	NUT: 1/4 compression, overflow tube tee (76040-142GC113).	ea	--	8	2	3	6	2	3	6	50	100	B-34	6
X1	F		....	NUT: 1/4-28 NF bracket 3, 4, 5 and 6 fuel lines (76040-21AX441).	ea	--	4	K	K	K	K	K	K	--	--	B-34	21
X1	F		....	NUT: pump (**Overhaul kit 76040-215SB49) (76040-261SZ247).	ea	--	3	K	K	K	K	K	K	--	--	B-34	31
X1	F		....	PLATE: clamp, tubes 1 & 2, 3 & 4, 5 & 6 (76040-253GCA1107).	ea	--	3	K	K	K	K	K	K	--	--	B-34	17
X1	O		....	PLUG: fuel inlet tee (76040-63AX4)	ea	--	1	K	K	K	K	K	K	--	--	B-34	50
X1	O		....	PLUG: elbow, overflow valve (76040-63AX3).	ea	--	1	K	K	K	K	K	K	--	--	B-34	57
X1	H		....	PUMP: transfer and primer assy (for details see fig. B-33) (76040-319GC19C).	ea	--	1	--	--	--	K	K	K	--	--	B-34	29
X1	H		....	SCREW: 1/4-28 NF x 1 1/4 (76040-1AX147).	ea	--	4	--	--	--	K	K	K	--	--	B-34	18
X1	H		....	SCREW: 1/4-20 NC x 1 (76040-4AX22) ...	ea	--	1	--	--	--	K	K	K	--	--	B-34	23
X1	H		....	SCREW: 3/8-16 NC x 5/8 (76040-4AX34) ..	ea	--	1	--	--	--	K	K	K	--	--	B-34	14

P	O		2910-974-7534	SLEEVE: compression (76040-52AX7)	ea	--	10	2	3	6	2	3	6	50	200	B-34	4
P	O		2910-974-7532	SLEEVE: compression (76040-513GC19)	ea	--	6	2	3	6	2	3	6	40	200	B-34	7
P	O		4730-974-7526	TEE: center, drain tube (76040-497GB167)	ea	--	1	*	2	2	*	2	2	10	10	B-34	8
P	O		4730-890-2382	TEE: injection pump fuel inlet (76040-63AX873).	ea	--	1	*	2	2	*	2	2	6	10	B-34	49
P	F		4730-974-7529	TEE: fuel filter outlet (76040-498GB122)	ea	--	1	*	2	2	*	2	2	10	10	B-34	24
P	O		4730-104-6365	TEE: manifold heater overflow (76040-497GB1139).	ea	--	1	*	2	2	*	2	2	6	10	B-34	10
P	O		4730-974-7528	TEE: overflow valve (76040-498GB121)	ea	--	1	*	2	2	*	2	2	10	10	B-34	55
P	F		2910-974-7428	TUBE: No. 1 nozzle, fuel inlet (76040-203GCA184A).	ea	--	1	2	3	5	2	3	5	30	10	B-34	45
P	F		2910-974-7429	TUBE: No. 2 nozzle, fuel inlet (76040-203GCA185A).	ea	--	1	2	3	5	2	3	5	30	10	B-34	44
P	F		2910-974-7430	TUBE: No. 3 nozzle, fuel inlet (76040-203GCA186A).	ea	--	1	2	3	5	2	3	5	30	10	B-34	42
P	F		2910-974-7431	TUBE: No. 4 nozzle, fuel inlet (76040-203GCA187A).	ea	--	1	2	3	5	2	3	5	30	10	B-34	41
P	F		2910-974-7432	TUBE: No. 5 nozzle, fuel inlet (76040-203GCA188A).	ea	--	1	2	3	5	2	3	5	30	10	B-34	40
P	F		2910-974-7433	TUBE: No. 6 nozzle, fuel inlet (76040-203GCA189).	ea	--	1	2	3	5	2	3	5	30	10	B-34	39
P	F		2910-974-7436	TUBE: fuel drain (76040-207GC239)	ea	--	1	*	2	2	*	2	2	10	10	B-34	43
P	O		2910-974-7434	TUBE: nozzle drain (76040-207GC134)	ea	--	3	2	2	3	2	2	3	20	40	B-34	3
P	O		------------	TUBE: nozzle drain (76040-207GC148)	ea	--	2	*	2	2	*	2	2	10	20	B-34	5
P	O		2910-974-7435	TUBE: nozzle drain (76040-207GC143)	ea	--	2	2	2	2	2	2	2	12	14	B-34	9
P	F		2910-974-7609	VALVE: check (76040-697GC18)	ea	--	1	*	2	2	*	2	2	10	10	B-34	54
P	O		2910-974-7611	VALVE: emergency fuel shutoff (76040-700GC19).	ea	--	1	*	2	2	*	2	2	10	10	B-34	48
P	O		2910-974-7607	VALVE: overflow (76040-697GC111)	ea	--	1	*	2	2	*	2	2	10	10	B-34	52
X1	H		------------	WASHER: lock (**Overhaul Kit 76040-215SB49) (76040-441SZ365).	ea	--	3	--	--	--	K	K	K	--	--	B-34	30
P	H		5310-974-7478	WASHER: 3/8 lock (76040-36AX3)	ea	--	1	--	--	--	*	2	2	10	20	B-34	15
X1	H		------------	WASHER: lock (76040-87GC121)	ea	--	1	--	--	--	K	K	K	--	--	B-34	22
X1	F		------------	ADAPTER: injection pump to block (76040-26GB412A).	ea	--	1	K	K	K	K	K	K	--	--	B-35	8
X1	F		------------	BRACKET: control wire (76040-25GB183)	ea	--	1	K	K	K	K	K	K	--	--	B-35	41
X1	F		------------	BRACKET: pump mounting, lower (76040-138GB115A).	ea	--	1	K	K	K	K	K	K	--	--	B-35	20
X1	F		------------	BRACKET: pump mounting, upper (76040-635GC117).	ea	--	1	K	K	K	K	K	K	--	--	B-35	17
X1	F		------------	BRACKET: throttle return spring (76040-253GC158A).	ea	--	1	K	K	K	K	K	K	--	--	B-35	35
X1	F		------------	BRACKET: throttle stop, front (for use with throttle lever assy 76040-67GCA124A) (76040-138GB120).	ea	--	1	K	K	K	K	K	K	--	--	B-35	26

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0302—FUEL PUMPS—Continued													
X1	F		------------	BRACKET: throttle stop, rear (for use with throttle lever assy 76040–67GCA124A) (76040–138GB27A).	ea	--	1	K	K	K	K	K	K	--	--	B–35	46
X1	F		------------	BUSHING: throttle lever (for use with throttle lever assy 76040–67GCA124A) (76040–186GB127).	ea	--	1	K	K	K	K	K	K	--	--	B–35	28
P	F		2910–974–7567	GASKET: injection pump adapter to block (**GASKET SET FSN 2815–890–2362) (76040–590GB190B).	ea	--	1	*	2	2	*	2	2	10	100	B–35	10
P	F		2815–974–7569	GASKET: injection pump to adapter (**GASKET SET FSN 2815–890–2362) (76040–562GB14).	ea	--	1	*	2	2	*	2	2	10	100	B–35	7
P	H	R	2910–974–7613	GOVERNOR: injection pump (Model 037B) (part of injection pump 76040–313GC4127) (for details see figs. B–40 B–41) (76040–709GB318).	ea	--	1	--	--	--	*	*	*	5	*	B–35	6
P	H	R	2910–890–2540	GOVERNOR: injection pump (Model 5749A) (part of injection pump 76040–313GC4127A) (for details see figs. B–40 & B–42 (76040–709GB318A).	ea	--	1	--	--	--	*	2	2	6	10	B–35	6
X1	H		------------	LEVER: fuel shutoff (76040–70GC114A)	ea	--	1	--	--	--	K	K	K	--	--	B–35	3
X1	H		------------	LEVER: injection pump throttle (for Engine FSN 2815–980–7092) (76040–67GC124A).	ea	--	1	--	--	--	K	K	K	--	--	B–35	30
X1	H		------------	LEVER: injection pump throttle (for Engine FSN 2815–087–2273) (76040–67GC145).	ea	--	1	--	--	--	K	K	K	--	--	B–35	30
X1	H		------------	LINK: throttle lever (for Engine FSN 2815–980–7092) (76040–922GC18).	ea	--	1	--	--	--	K	K	K	--	--	B–35	31
X1	H		------------	NUT: 1/4-28 NF fuel shutoff lever (1) wire bracket (1) (76040–20AX1).	ea	--	2	--	--	--	K	K	K	--	--	B–35	1
X1	H		------------	NUT: 5/16-24 NF (76040–20AX2)	ea	--	1	--	--	--	K	K	K	--	--	B–35	38
P	F		5310–023–2397	NUT: 3/8-16 NC (for Engine FSN 2815–980–7092) (76040–22AX21).	ea	--	4	2	2	2	2	2	2	24	30	B–35	25
X1	F		------------	PIN: 1/16 x 1/2 cotter (for Engine FSN	ea	--	1	K	K	K	K	K	K	--	--	B–35	33

				2815-980-7092) (76040-29AX10).													
P	H		5315-974-7423	PIN: retractor spring (for Engine FSN 2815-980-7092) (76040-183GC120).	ea	--	1	--	--	--	•	2	2	5	10	B-35	39
P	F		5310-023-2705	PIN: throttle lever (for Engine FSN 2815-980-7092) (76040-33AX62).	ea	--	1	•	2	2	•	2	2	6	10	B-35	29
				PLATE: name, governor identification (76040-305SB54).	ea	--	1	K	K	K	K	K	K	--	--	B-35	44
				PLUG: injector pump adapter inspection hole (76040-49AX155).	ea	--	1	K	K	K	K	K	K	--	--	B-35	14
P	F	R	2910-890-2548	PUMP: fuel injection Model 5748A (complete w/governor 76040-709GB318A) (76040-318GC4127A).	ea	--	1	--	--	--	2	2	3	6	10	B-35	5
X1	F		------------	RIVET: nameplate (76040-361SZ284) -----	ea	--	2	K	K	K	K	K	K	--	--	B-35	43
P	F		2910-890-2516	SCREW: adapter to cyl block (76040-6AX679).	ea	--	3	2	2	3	2	2	3	18	30	B-35	12
P	F		5305-018-1314	SCREW: 1/4-28 NF x 7/8 injection pump shutoff lever (76040-1AX32).	ea	--	1	•	2	2	•	2	2	6	10	B-35	4
P	F		5305-225-3889	SCREW: 1/4-20 NC x 1 throttle lever (1) throttle stop bracket, rear (2) (for Engine FSN 2815-980-7092) (96906-MS35297-8).	ea	--	3	2	2	3	2	2	3	18	30	B-35	32
P	F		5305-021-1887	SCREW: 1/4-20 NC x 1 throttle stop (front and rear) (for Engine FSN 2815-980-7092) (76040-6AX401).	ea	--	4	2	2	3	2	2	3	24	40	B-35	27
X1	F		------------	SCREW: 1/4-28 NF x 3/4 wire bracket (76040-1AX374).	ea	--	1	K	K	K	K	K	K	--	--	B-35	42
X1	F		------------	SCREW: 1/4-28 NF x 3/8 wire bracket mounting (76040-1AX123).	ea	--	2	K	K	K	K	K	K	--	--	B-35	40
P	H		2910-890-2515	SCREW: governor rear, wire seal (76040-361SZ290).	ea	--	4	--	--	--	2	2	3	24	30	B-35	45
P	F		5305-069-3210	SCREW: 3/8-16 NC x 7/8 bracket to block (76040-4AX58).	ea	--	2	2	2	2	2	2	2	12	24	B-35	19
P	F		5305-639-8118	SCREW: 3/8-16 NC x 1 1/4 pump to adapter (76040-4AX16).	ea	--	5	2	3	5	2	3	5	30	50	B-35	16
X1	F		------------	SCREW: 3/8-16 NC x 1 1/8 pump to adapter, upper (76040-6AX829).	ea	--	1	K	K	K	K	K	K	--	--	B-35	9
P	F		------------	SCREW: 3/8-16 NC x 1 1/2 throttle stop (2) mounting bracket (1) (for Engine FSN 2815-980-7092) (76040-6AX722).	ea	--	3	2	2	3	2	2	3	18	30	B-35	24
X1	F		------------	SCREW: 7/16-14 NC x 1, bracket to pump (76040-4AX27).	ea	--	2	K	K	K	K	K	K	--	--	B-35	22
P	F		2910-974-7518	SEAL: wire locking, injection pump and governor (76040-449GC112A).	ea	--	6	2	4	7	2	4	7	60	120	B-35	47
P	F		2815-974-7514	SEAL: preformed packing adapter inspection plug (**GASKET SET FSN 2815-890-2362) (76040-446GC175).	ea	--	1	2	2	3	2	2	3	20	140	B-35	13

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0302—FUEL PUMPS—Continued													
P	F		2910–974–7556	SPRING: retractor (for Engine FSN 2815–980–7029) (76040–58AX218).	ea	--	1	*	2	2	*	2	2	6	10	B–35	34
P	F		5310–023–4217	WASHER: adapter to cyl block (76040–37AX166).	ea	--	3	2	2	3	2	2	3	20	30	B–35	11
P	F		5310–023–3470	WASHER: 1/4 lock (76040–36AX1) -------	ea	--	15	5	9	15	5	9	15	90	150	B–35	2
P	F		5310–023–4161	WASHER: 5/16 flat (76040–37AX1) ------	ea	--	1	*	2	2	*	2	2	6	10	B–35	36
X1	F		--------------	WASHER: 5/16 lock (76040–36AX22) ----	ea	--	1	K	K	K	K	K	K	--	--	B–35	37
P	F		5310–974–7478	WASHER: 3/8 lock (76040–36AX3) ------	ea	--	3	2	2	2	2	2	2	12	24	B–35	18
X1	F		--------------	WASHER: 7/16 lock (76040–36AX4) ------	ea	--	2	K	K	K	K	K	K	--	--	B–35	21
X1	F		--------------	WASHER: 5/8 lock (76040–36AX7) -------	ea	--	5	K	K	K	K	K	K	--	--	B–35	15
X1	F		--------------	WASHER: spacer (76040–35AX1278) ------	ea	--	1	K	K	K	K	K	K	--	--	B–35	23
X1	H		--------------	BAFFLE: oil (**Overhaul Kit 76040–215SB49) (76040–40SB11).	ea	--	1	--	--	--	K	K	K	--	--	B–36	2
X1	F		--------------	BUSHING: rack protection cover (76040–24SB30).	ea	--	1	K	K	K	K	K	K	--	--	B–36	18
P	H		2910–890–2520	BUSHING: shutoff lever (for Injection Pump model 5748A) (76040–24SB32).	ea	--	2	----	--	--	*	2	2	6	10	B–36	8
P	H		2910–890–2518	BUSHING: shutoff lever (for Injection Pump model 5036B) (76040–24SB33).	ea	--	2	--	--	--	*	2	2	6	10	B–36	8
X1	F		--------------	COVER: inspection (76040–42SB76) -------	ea	--	1	K	K	K	K	K	K	--	--	B–36	28
X1	F		--------------	COVER: rack protection (76040–42SB55) ---	ea	--	1	K	K	K	K	K	K	--	--	B–36	19
P	H		2910–974–7412	GASKET: inspection cover (**Gasket Set 76040–209SB16) (76040–122SB101).	ea	--	1	--	--	--	*	2	2	10	100	B–36	27
X1	H		--------------	GASKET: base plug (**Gasket Set 76040–209SB16) (76040–122SB99).	ea	--	6	--	--	--	K	K	K	--	--	B–36	25
X1	H		--------------	GASKET: barrel locating screw (6), tappet guide screw (6) (**Gasket Set 76040–209SB16) (76040–122SB98).	ea	--	12	--	--	--	K	K	K	--	--	B–36	13
X1	H		--------------	GASKET: oil baffle (**Overhaul Kit 76040–215SB49) (76040–122SB107).	ea	--	1	--	--	--	K	K	K	-	--	B–36	3
X1	H		--------------	KEY: camshaft (**Overhaul Kit 76040–215SB49) (76040–201SZ73).	ea	--	1	--	--	--	K	K	K	--	--	B–36	24
P	H		2910–890–2542	LEVER: inner stop (76040–223SB26) ------	ea	--	1	--	--	--	*	2	2	6	10	B–36	6
X1	H		--------------	PLATE: end (76040–305SB37) ------------	ea	--	1	--	--	--	K	K	K	--	--	B–36	23
X1	F		--------------	PLUG: base hole (76040–301SB63) -------	ea	--	6	K	K	K	K	K	K	--	--	B–36	26
X1	F		--------------	PLUG: shutoff lever (for Injection Pump model 5036B) (76040–304SZ106).	ea	--	1	K	K	K	K	K	K	--	--	B–36	11
X1	F		--------------	PIN: cotter (76040–302SZ143) ----------	ea	--	1	K	K	K	K	K	K	--	--	B–36	35

X1	F	------------	PIN: locking (76040-311SB33)	ea	--	1	K	K	K	K	K	K	--	--	B-36	15
P	H	------------	RING: injection pump coupling (76040-347GC124).	ea	--	1	K	K	K	K	K	K	--	--	B-36	22
P	H	2910-890-2521	RING: snap (for Injection Pump model 5036B) (76040-343SZ31).	ea	--	1	--	--	--	•	2	2	6	10	B-36	10
X1	H	------------	RING: stop lever retaining (for Injection Pump model 5748A) (76040-343SB73).	ea	--	1	--	--	--	K	K	K	--	--	B-36	4
X1	H	------------	SCREW: rack eextension (76040-361SZ283)	ea	--	1	--	--	--	K	K	K	--	--	B-36	17
X1	H	------------	SCREW: end plate (76040-361SZ287)	ea	--	3	--	--	--	K	K	K	--	--	B-36	21
X1	H	------------	SCREW: tappet guide (**Overhaul Kit 76040-215SB49) (76040-361SZ279).	ea	--	6	--	--	--	K	K	K	--	--	B-36	14
X1	H	------------	SCREW: barrel locating (**Overhaul Kit 76040-215SB49) (76040-361SZ280).	ea	--	6	--	--	--	K	K	K	--	--	B-36	33
P	F	5305-974-7502	SCREW: retractor spring bracket stud (for Injection Pump model 5036B) (76040-421GC135).	ea	--	1	•	2	2	•	2	2	8	10	B-36	31
P	H	2910-890-2510	SCREW: inspection cover (76040-361SZ441)	ea	--	6	--	--	--	2	3	5	36	50	B-36	32
P	H	2910-890-2511	SCREW: inspection cover lockwire (76040-361SZ442).	ea	--	2	--	--	--	•	2	2	12	24	B-36	30
X1	H	------------	SCREW: oil baffle (**Overhaul Kit 76040-215SB49) (76040-368SZ31).	ea	--	1	--	--	--	K	K	K	--	--	B-36	1
X1	H	------------	SCREW: rack stop (**Overhaul Kit 76040-215SB49) (76040-361SZ278).	ea	--	1	--	--	--	K	K	K	--	--	B-36	12
P	H	2910-890-2543	SEAL: shutoff lever (for Injection Pump model 5748A) (76040-343SB64).	ea	--	1	--	--	--	•	2	2	10	10	B-36	37
P	H	2910-890-2541	SEAL: Shutoff lever (for Injection Pump model 5036B) (**Overhaul Kit 76040-215SB49) (76040-364SZ161).	ea	--	1	--	--	--	•	2	2	10	10	B-36	37
P	H	2910-890-2544	SHAFT: shutoff lever (for Injection Pump model 5036B) (76040-364SB40).	ea	--	1	--	--	--	•	2	2	6	10	B-36	36
X1	H	------------	SHAFT: shutoff lever (for Injection Pump model 5748A) (76040-364SB70).	ea	--	1	--	--	--	K	K	K	--	--	B-36	36
X1	H	------------	SHIM: injection pump (** Shim Set 76040-215SB87) NPN.	ea	--	1	--	--	--	K	K	K	--	--	B-36	16
X1	H	------------	SPACER: stop lever (for Injection Pump model 5036B) (76040-366SB16).	ea	--	1	--	--	--	K	K	K	--	--	B-36	5
P	H	2910-890-2505	SPRING: stop lever (76040-362SB73)	ea	--	1	--	--	--	•	2	2	8	10	B-36	7
X1	H	------------	WASHER: stop lever (for Injection Pump model 5036B) (76040-441SZ311).	ea	--	1	--	--	--	K	K	K	--	--	B-36	9
X1	H	------------	WASHER: inspection cover (**Overhaul Kit 76040-215SB49) (76040-441SZ379).	ea	--	9	--	--	--	K	K	K	--	--	B-36	29
X1	H	------------	WASHER: stop lever (for Injection Pump model 5036B) (76040-441SZ312).	ea	--	1	--	--	--	K	K	K	--	--	B-36	34
X1	H	------------	WIRE: lock, soft (76040-442SZ16)	ft	--	≠	--	--	--	K	K	K	--	--	B-36	20
P	H	2815-890-2361	BEARING: camshaft, ctr (76040-39SB12)	ea	--	1	--	--	--	•	2	2	6	10	B-37	16

(1) Source, Main. and Recov. Code			(2)	(3)	(4)	(5)	(6)	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9)	(10)	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.	Federal Stock Number	Description	Unit of Issue	Qty Inc in Unit Pack	Qty Inc in Unit	(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100	1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	Depot Maint. Alw. Per 100 Equip.	(a) Fig. No.	(b) Item or Sym. No.
				0302—FUEL PUMPS—Continued													
P	H		2815–890–2359	BEARING; TAPERED, ROLLER: camshaft, front and rear (76040–39SB11).	ea	--	2	--	--	--	2	2	2	12	24	B–37	5
X1	H		--------------	BUSHING: control rack (76040–24SB31)	ea	--	2	--	--	--	K	K	K	--	--	B–37	6
P	H		2815–890–2360	CAMSHAFT: fuel injection pump (76040–364SB39).	ea	--	1	--	--	--	*	2	2	6	10	B–37	15
X1	H		--------------	GASKET: center brg screw (**Gasket Set 76040–209SB16) (76040–122SB106).	ea	--	2	--	--	--	K	K	K	--	--	B–37	17
P	H		2910–974–7415	GASKET: delivery valve (**Gasket Set 76040–209SB16) (76040–122SB94).	ea	--	6	--	--	--	2	2	3	20	60	B–37	8
X1	H		--------------	GEAR: control segment (76040–125SB22)	ea	--	6	--	--	--	K	K	K	--	--	B–37	33
P	H		2910–974–7610	HOLDER: delivery valve (76040–697GC21)	ea	--	6	--	--	--	*	2	2	10	60	B–37	10
X1	H		--------------	HOUSING: pump (for Injection Pump model 5748A) (76040–144SB65).	ea	--	1	--	--	--	K	K	K	--	--	B–37	13
X1	H		--------------	HOUSING: pump (for Injection Pump model 5036B) (76040–144SB33).	ea	--	1	--	--	--	K	K	K	--	--	B–37	13
X1	H		--------------	NUT: delivery valve, retaining (76040–261–SZ245).	ea	--	6	--	--	--	K	K	K	--	--	B–37	11
X1	H		--------------	PLATE: end (76040–305SB38)	ea	--	1	--	--	--	K	K	K	--	--	B–37	3
X1	H		--------------	PLUNGER AND BARREL ASSEMBLY: (76040–309SB21).	ea	--	6	--	--	--	K	K	K	--	--	B–37	30
X1	H		--------------	RACK: control (76040–348SB11)	ea	--	1	--	--	--	K	K	K	--	--	B–37	14
P	H		2910–890–2514	SCREW: center brg cap (76040–361SZ285)	ea	--	2	--	--	--	2	2	2	12	24	B–37	20
X1	H		--------------	SCREW: control gear segment (76040–365SZ148).	ea	--	6	--	--	--	K	K	K	--	--	B–37	34
X1	H		--------------	SCREW: end plate (**Overhaul Kit 76040–215SB49) (76040–361SZ288).	ea	--	4	--	--	--	K	K	K	--	--	B–37	1
X1	H		--------------	SEAT: plunger spring, lower (76040–377SB18).	ea	--	6	--	--	--	K	K	K	--	--	B–37	29
X1	H		--------------	SEAT: plunger spring, upper (76040–377SB19).	ea	--	6	--	--	--	K	K	K	--	--	B–37	32
X1	H		--------------	SHIM: camshaft adjusting (**Shim Set 76040–215SB87).	ea	--	1	--	--	--	K	K	K	--	--	B–37	4
X1	H		--------------	SLEEVE: control (76040–374SB20)	ea	--	6	--	--	--	K	K	K	--	--	B–37	7
P	H		2910–890–2546	SPRING: delivery valve (76040–362SB69)	ea	--	6	--	--	--	2	2	3	18	30	B–37	9
P	H		2910–890–2547	SPRING: plunger (76040–362SB71)	ea	--	6	--	--	--	2	2	3	18	30	B–37	31
X1	H		--------------	STUD: supply pump (76040–370SB17)	ea	--	3	--	--	--	K	K	K	--	--	B–37	28

X1	H	--------------	TAPPET ASSEMBLY: (76040-386SB11)	ea	--	6	--	--	--	K	K	K	--	--	B-37	21
			Consists of:													
X1	H	--------------	1 KNOB: tappet (76040-216SB12)	--	--	--	--	--	--	K	K	K	--	--	B-37	27
X1	H	--------------	1 PIN: tappet (76040-311SB32)	--	--	--	--	--	--	K	K	K	--	--	B-37	22
P	H	--------------	1 RING: snap (76040-343SB27)	--	--	--	--	--	--	2	2	2	12	40	B-37	25
X1	H	--------------	1 ROLLER: w/bushing tappet (76040-347SB11).	--	--	--	--	--	--	K	K	K	--	--	B-37	23
X1	H	--------------	1 SHELL: tappet (76040-371SB17)	--	--	--	--	--	--	K	K	K	--	--	B-37	24
X1	H	--------------	1 SPACER: tappet (**Shim Set 76040-215SB87).	--	--	--	--	--	--	K	K	K	--	--	B-37	26
P	H	2910-974-7608	VALVE: assy, delivery (76040-697GCA112)	ea	--	6	--	--	--	•	2	2	10	60	B-37	12
X1	H	--------------	WASHER: end plate (**Oerhaul Kit 76040-215SB49) (76040-441SZ310).	ea	--	3	--	--	--	K	K	K	--	--	B-37	2
P	H	2910-890-2512	WASHER: flat, ctr brg (76040-441SB55)	ea	--	2	--	--	--	2	2	2	12	20	B-37	18
P	H	5310-023-4229	WASHER: lock (76040-441SZ390)	ea	--	2	--	--	--	2	2	2	12	20	B-37	19
X1	F	--------------	ADAPTER: hand primer (76040-1SB20)	ea	--	1	K	K	K	K	K	K	--	--	B-38	2
P	F	2910-890-2545	HAND PRIMER ASSEMBLY: (76040-312SB18).	ea	--	1	•	2	2	•	2	2	6	10	B-38	3
			Consists of:													
X1	F	--------------	1 BARREL: hand primer	--	--	--	K	K	K	K	K	K	--	--	B-38	9
X1	F	--------------	1 BRACKET ASSEMBLY: hand primer (76040-79-BK7949A).	--	--	--	K	K	K	K	K	K	--	--	B-38	4
X1	F	--------------	1 PACKING, PREFORMED: plunger (76040-343SB31).	--	--	--	K	K	K	K	K	K	--	--	B-38	8
X1	F	--------------	1 PIN, CROSS: hand primer (76040-79-PN7997).	--	--	--	K	K	K	K	K	K	--	--	B-38	5
X1	F	--------------	1 PLUNGER: hand primer	--	--	--	K	K	K	K	K	K	--	--	B-38	6
X1	F	--------------	1 WASHER, SEALING: knob (76040-79-WA1967).	--	--	--	K	K	K	K	K	K	--	--	B-38	7
P	H	2910-974-7468	PUMP ASSEMBLY: fuel injection transfer (76040-319GC110).	ea	--	1	--	--	--	•	2	2	8	10	B-38	25
			Consists of:													
X1	H	--------------	2 GASKET: valve spring screw (76040-441SB77).	--	--	--	--	--	--	K	K	K	--	--	B-38	24
X1	H	--------------	1 GASKET: plunger spring screw (76040-122SB116).	--	--	--	--	--	--	K	K	K	--	--	B-38	12
X1	H	--------------	1 HOUSING: fuel pump (76040-144SB41).	--	--	--	--	--	--	K	K	K	--	--	B-38	16
X1	H	--------------	1 PIN: tappet roller (76040-311SB35)	--	--	--	--	--	--	K	K	K	--	--	B-38	17
X1	H	--------------	1 PIN: tappet shell (76040-311SB37)	--	--	--	--	--	--	K	K	K	--	--	B-38	21
X1	H	--------------	1 PLUNGER: (76040-309SB29)	--	--	--	--	--	--	K	K	K	--	--	B-38	14
X1	H	--------------	1 ROLLER: tappet shell (76040-347SB12).	--	--	--	--	--	--	K	K	K	--	--	B-38	18
X1	H	--------------	1 SCREW: plunger spring (76040-365SB70).	--	--	--	--	--	--	K	K	K	--	--	B-38	11
X1	H	--------------	1 SCREW: valve spring (76040-365SB60).	--	--	--	--	--	--	K	K	K	--	--	B-38	1

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1-20	(b) 21-50	(c) 51-100	(a) 1-20	(b) 21-50	(c) 51-100			(a) Fig. No.	(b) Item or Sym. No.
				0302—FUEL PUMPS—Continued													
X1	H		....	1 SHELL: tappet (76040-371SB18)	--	--	--	--	--	--	K	K	K	--	--	B-38	19
X1	H		....	1 SPINDLE: tappet shell (76040-380SB23).	--	--	--	--	--	--	K	K	K	--	--	B-38	15
X1	H		....	2 SPRING: valve (76040-362SB91)	--	--	--	--	--	--	K	K	K	--	--	B-38	23
X1	H		....	1 SPRING: plunger (76040-362SB146)	--	--	--	--	--	--	K	K	K	--	--	B-38	13
X1	H		....	1 SPRING: tappet (76040-362SB90)	--	--	--	--	--	--	K	K	K	--	--	B-38	20
X1	H		....	2 VALVE: (76040-424SB31)	--	--	--	--	--	--	K	K	K	--	--	B-38	22
X1	H		....	WASHER: primer pump sealing (76040-122SB114).	ea	--	1	--	--	--	K	K	K	--	--	B-38	10
				0305—SUPERCHARGER, BLOWER, TURBOCHARGER OR ALTITUDE COMPENSATOR													
X1	O		....	ADAPTER: exhaust outlet (76040-90RU282).	ea	--	1	K	K	K	K	K	K	--	--	B-39	41
X1	O		....	BRACKET: exhaust outlet adapter (76040-8ME346).	ea	--	1	K	K	K	K	K	K	--	--	B-39	35
P	O		4730-890-2386	CLAMP: oil hose at breather pipe (76040-180GB135).	ea	--	1	*	2	2	*	2	2	6	10	B-39	14
P	O		4730-890-2375	CLAMP: oil hose, lower (76040-180GB137)	ea	--	1	*	2	2	*	2	2	6	10	B-39	26
P	O		4730-974-7625	CLAMP: manifold tube (76040-83AX454)	ea	--	6	2	3	5	2	3	5	30	40	B-39	15
P	O		4730-890-2374	CLAMP: exhaust elbow (76040-48RU2110)	ea	--	2	2	2	2	2	2	2	12	20	B-39	39
P	O		2940-890-2560	CONNECTOR: vent tube (76040-63AX494)	ea	--	1	*	2	2	*	2	2	6	10	B-39	22
X1	O		....	ELBOW: complete exhaust (76040-4ME3882).	ea	--	1	K	K	K	K	K	K	--	--	B-39	4
X1	O		....	ELBOW: oil drain (76040-63AX520)	ea	--	1	K	K	K	K	K	K	--	--	B-39	32
P	O		4730-890-2389	ELBOW: oil inlet tube at filter base (76040-63AX372).	ea	--	1	*	2	2	*	2	2	6	10	B-39	27
P	O		4730-890-2390	ELBOW: vent tube (76040-63AX495)	ea	--	1	*	2	2	*	2	2	6	10	B-39	18
X1	F		....	GASKET: exhaust elbow (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-590GB1167A).	ea	--	1	K	K	K	K	K	K	--	--	B-39	5
P	F		2990-974-7548	GASKET: turbocharger oil drain (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-56AX357).	ea	--	2	*	2	2	*	2	2	10	100	B-39	29

P	F		2990-974-7547	GASKET: turbocharger oil inlet (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-56AX356).	ea	--	1	*	2	2	*	2	2	10	100	B-39	7
P	O		2990-974-7562	GASKET: turbocharger to exhaust manifold (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-590GB1189).	ea	--	1	*	2	2	*	2	2	10	100	B-39	23
P	O		2990-974-7477	HOSE: assy, oil drain (76040-36RUA1164P4).	ea	--	1	*	2	2	*	2	2	6	10	B-39	30
P	O		4720-890-5017	HOSE: assy, oil inlet (76040-36RUA3138P42).	ea	--	1	*	2	2	*	2	2	6	10	B-39	13
P	O		2990-089-7942	HOSE: inlet manifold (76040-744GB124)	ea	--	2	*	2	2	*	2	2	6	10	B-39	16
X1	O		....	NUT: 7/16-14 NC bracket (76040-23AX595).	ea	--	2	K	K	K	K	K	K	--	--	B-39	37
X1	O		....	NUT: 5/16-24 NF clamp (76040-21AX692)	ea	--	2	K	K	K	K	K	K	--	--	B-39	38
X1	O		....	NUT: 5/16-18 NC clamp (76040-22AX20)	ea	--	1	K	K	K	K	K	K	--	--	B-39	24
X1	O		....	NUT: 3/8 compression (76040-63AX361)	ea	--	2	K	K	K	K	K	K	--	--	B-39	20
X1	O		....	NUT: 3/8-24 NF exhaust elbow (6) turbocharger to manifold (4) (76040-21AX691).	ea	--	10	K	K	K	K	K	K	--	--	B-39	1
X1	O		....	PIN: straight (76040-31AX542)	ea	--	2	K	K	K	K	K	K	--	--	B-39	40
X1	O		....	PLUG: 1/8 pipe (76040-63AX3)	ea	--	1	K	K	K	K	K	K	--	--	B-39	12
X1	O		....	SCREW: 3/8-24 NF x 2 mounting (76040-1AX34).	ea	--	4	K	K	K	K	K	K	--	--	B-39	31
X1	O		....	SCREW: 3/8-16 NC x 1 adapter (76040-4AX1).	ea	--	2	K	K	K	K	K	K	--	--	B-39	33
X1	O		....	SCREW: 5/16-24NF x 1 1/4 clamp (76040-3AX629).	ea	--	2	K	K	K	K	K	K	--	--	B-39	42
X1	O		....	SCREW: 3/8-16 NC x 3/4 oil tube flange (76040-6AX847).	ea	--	4	K	K	K	K	K	K	--	--	B-39	10
X1	O		....	SLEEVE: 5/16 compression (76040-52AX4).	ea	--	2	K	K	K	K	K	K	--	--	B-39	19
P	O		5307-023-3356	STUD: 3/8-24 NF x 3/8-16 NC (76040-16AX809).	ea	--	6	*	2	2	*	2	2	6	10	B-39	3
P	O		4730-890-2388	TEE: oil inlet (76040-63AX3285)	ea	--	1	*	2	2	*	2	2	6	10	B-39	11
X1	O		....	TUBE: assy, oil drain (76040-681GCA111)	ea	--	1	K	K	K	K	K	K	--	--	B-39	28
X1	O		....	TUBE: inlet manifold (76040-680GC420)	ea	--	1	K	K	K	K	K	K	--	--	B-39	17
X1	O		....	TUBE: oil inlet elbow (76040-208GCA154)	ea	--	1	K	K	K	K	K	K	--	--	B-39	8
X1	O		....	TUBE: vent (76040-100AX66P15)	ea	--	1	K	K	K	K	K	K	--	--	B-39	21
P	O	R	2990-974-7583	TURBOCHARGER: assy (refer to TM 9-2990-201-45 for component parts) (76040-631GC559).	ea	--	1	*	2	2	*	2	2	6	10	B-39	6
X1	O		....	WASHER: 3/8 lock, oil inlet (2) oil drain (2) (76040-36AX3).	ea	--	4	K	K	K	K	K	K	--	--	B-39	9
X1	O		....	WASHER: 5/16 lock, clamp (76040-36AX22).	ea	--	1	K	K	K	K	K	K	--	--	B-39	25
X1	O		....	WASHER: 3/8 plain (76040-37AX7)	ea	--	6	K	K	K	K	K	K	--	--	B-39	2
X1	O		....	WASHER: 7/16 plain (76040-37AX9)	ea	--	2	K	K	K	K	K	K	--	--	B-39	34
X1	O		....	WASHER: 3/8 plain (76040-37AX265)	ea	--	2	K	K	K	K	K	K	--	--	B-39	36

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0308—ENGINE SPEED GOVERNOR AND CONTROLS													
P	H		2910–105–2702	SHIM SET: injection pump governor (19207–5704266).	ea	--	1	--	--	--	2	3	4	12	24	--	--
				Consists of:													
				SHIM: drive gear	--	--	--	--	--	--	--	--	--	--	--	B–41	18
					--	--	--	--	--	--	--	--	--	--	--	B–42	26
X1	H			1—.005 (76040–366SB24P7)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.010 (76040–366SB24P6)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.015 (76040–366SB24P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.020 (76040–366SB24P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.035 (76040–366SB24P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.049 (76040–366SB24P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.065 (76040–366SB24P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
				Consists of:													
				SHIM: end cap spring (for governor model 5037B).	--	--	--	--	--	--	--	--	--	--	--	B–41	1
X1	H			1—.008 (76040–375SB24P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.012 (76040–375SB24P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.020 (76040–375SB24P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.040 (76040–375SB24P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
				Consists of:													
				SHIM: operation shaft or inner spring	--	--	--	--	--	--	--	--	--	--	--	B–40	32
					--	--	--	--	--	--	--	--	--	--	--	B–41	6
					--	--	--	--	--	--	--	--	--	--	--	B–42	2
X1	H			2—.010 (76040–366SB17P7)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			2—.020 (76040–366SB17P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			2—.042 (76040–366SB17P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			2—.058 (76040–366SB17P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			2—.083 (76040–366SB17P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			2—.177 (76040–366SB17P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			2—.276 (76040–366SB17P6)	--	--	--	--	--	--	K	K	K	--	--	--	--
				Consists of:													
				SHIM: outer spring	--	--	--	--	--	--	--	--	--	--	--	B–41	7
					--	--	--	--	--	--	--	--	--	--	--	B–42	3
X1	H			1—.010 (76040–366SB17P7)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.020 (76040–366SB17P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.042 (76040–366SB17P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H			1—.058 (76040–366SB17P3)	--	--	--	--	--	--	K	K	K	--	--	--	--

X1	H		1—.083 (76040-366SB17P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.177 (76040-366SB17P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.276 (76040-366SB17P6)	--	--	--	--	--	--	K	K	K	--	--	--	--
			Consists of:												B-41	27
			WASHER: weight shim (for governor model 5037B).	--	--	--	--	--	--	--	--	--	--	--		
X1	H		1—.036 (76040-441SB44)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.038 (76040-441SB50)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.040 (76040-441SB51)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.044 (76040-441SB52)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.048 (76040-441SB53)	--	--	--	--	--	--	K	K	K	--	--	--	--
			Consists of:												B-42	9
			WASHER: weight shim (for governor model 5749A).	--	--	--	--	--	--	--	--	--	--	--		
X1	H		1—.036 (76040-144SB79P1)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.038 (76040-144SB79P2)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.040 (76040-114SB79P3)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.044 (76040-144SB79P4)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		1—.048 (76040-144SB79P5)	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		BRACKET: fulcrum lever (76040-22SB33)	ea	--	1	--	--	--	K	K	K	--	--	B-40	33
X1	H		BRIDGE: stop plate (76040-25SB17)	ea	--	1	--	--	--	K	K	K	--	--	B-40	9
P	H	2910-890-2507	BUSHING; shaft (76040-24SB48A)	ea	--	2	--	--	--	*	2	2	12	20	B-40	13
X1	H		CAM: stop (76040-51SB16)	ea	--	1	--	--	--	K	K	K	--	--	B-40	17
X1	H		CAP: end (used on governor model 5037B) (76040-41SB30).	ea	--	1	--	--	--	K	K	K	--	--	B-40	43
X1	H		CAP: end (used on governor model 5749A) (76040-41SB31).	ea	--	1	--	--	--	K	K	K	--	--	B-40	42
X1	H		COVER: stop flange, lower (76040-42SB58)	ea	--	1	--	--	--	K	K	K	--	--	B-40	37
X1	H		COVER: stop flange, upper (76040-42SB59)	ea	--	1	--	--	--	K	K	K	--	--	B-40	49
X1	H		COVER: governor top (76040-42SB61)	ea	--	1	--	--	--	K	K	K	--	--	B-40	5
P	H	5330-805-8758	GASKET: end cap (used on governor model 5037B) (76040-122SB100).	ea	--	1	--	--	--	*	2	2	10	15	B-40	44
P	H	5330-805-8818	GASKET: governor to injection pump (76040-122SB133).	ea	--	1	--	--	--	2	2	2	6	10	B-40	25
P	H	5330-805-9210	GASKET: preformed packing, end cap (used on governor model 5749A) (76040-122SB156).	ea	--	1	--	--	--	*	2	2	8	12	B-40	45
P	H	2910-974-7413	GASKET: top cover (76040-122SB112)	ea	--	1	--	--	--	2	2	3	10	8	B-40	6
X1	H		HOUSING: governor (76040-144SB34)	ea	--	1	--	--	--	K	K	K	--	--	B-40	12
X1	H		HUB: spring (76040-147SB12)	ea	--	1	--	--	--	K	K	K	--	--	B-40	30
X1	H		LEVER: fulcrum (76040-223SB37)	ea	--	1	--	--	--	K	K	K	--	--	B-40	18
X1	H		LINK: control rack (76040-221SB23)	ea	--	1	--	--	--	K	K	K	--	--	B-40	20
X1	H		NUT: adjusting idle (76040-221SZ17)	ea	--	1	--	--	--	K	K	K	--	--	B-40	48
X1	H		NUT: adjusting load (76040-221SZ16)	ea	--	1	--	--	--	K	K	K	--	--	B-40	51
X1	H		NUT: link (1) cam (1) (76040-261SB28)	ea	--	2	--	--	--	K	K	K	--	--	B-40	19
X1	H		NUT: lock, droop screw (1) stop plate (2) (76040-261SB31).	ea	--	3	--	--	--	K	K	K	--	--	B-40	11

(1) Source, Main. and Recov. Code			(2)	(3)	(4)	(5)	(6)	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9)	(10)	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.	Federal Stock Number	Description	Unit of Issue	Qty Inc in Unit Pack	Qty Inc in Unit	(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100	1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	Depot Maint. Alw. Per 100 Equip.	(a) Fig. No.	(b) Item or Sym. No.
				0308—ENGINE SPEED GOVERNOR AND CONTROLS—Continued													
X1	H		--------------	PIN: bracket to lever (76040–302SZ151)	ea	--		--	--	--	K	K	K	--	--	B–40	34
X1	H		--------------	PIN: control rack (76040–311SB53)	ea	--	1	--	--	--	*	K	K	--	--	B–40	22
X1	H		--------------	PIN: cotter (76040–302SZ153)	ea	--	1	--	--	--	K	K	K	--	--	B–40	35
X1	H		--------------	PIN: locating (76040–302SZ147)	ea	--	2	--	--	--	K	K	K	--	--	B–40	15
X1	H		--------------	PLATE ASSEMBLY: stop (76040–305SB53).	ea	--	1	--	--	--	K	K	K	--	--	B–40	46
P	H		4730–890–2379	PLUG: shaft, end (76040–304SZ106)	ea	--	1	--	--	--	*	2	2	6	10	B–40	14
X1	H		--------------	PLUNGER: weight lubricpting (76040–309SB23).	ea	--	1	--	--	--	K	K	K	--	--	B–40	28
P	H		2910–890–2508	RING: snap (76040–343SB40)	ea	--	2	--	--	--	2	3	4	12	20	B–40	21
X1	H		--------------	SCREW: adjusting, idle (76040–367SZ23)	ea	--	1	--	--	--	K	K	K	--	--	B–40	47
X1	H		--------------	SCREW: adjusting, load (76040–367SZ22)	ea	--	1	--	--	--	K	K	K	--	--	B–40	50
X1	H		--------------	SCREW: cam to link (76040–361SZ299)	ea	--	1	--	--	--	K	K	K	--	--	B–40	52
P	H		2910–890–2509	SCREW: governor housing (7) end cap (2) bridge (2) (76040–361SZ280).	ea	--	11	--	--	--	4	8	13	66	120	B–40	7
X1	H		--------------	SCREW: hub fastening, 1/2 lg round end (for shaft 76040–364SZ41) (76040–361SZ292).	ea	--	1	--	--	--	K	K	K	--	--	B–40	29
P	H		5305–021–2283	SCREW: hub fastening, 5/8 lg taper point (for shaft 76040–364SB61) (76040–361SZ568).	ea	--	1	--	--	--	*	2	2	6	10	B–40	29
X1	H		--------------	SCREW: lever adjusting (76040–368SZ81)	ea	--	1	--	--	--	K	K	K	--	--	B–40	16
X1	H		--------------	SCREW: shaft cover lower (76040–361SZ295).	ea	--	2	--	--	--	K	K	K	--	--	B–40	39
X1	H		--------------	SCREW: shaft cover upper (76040–361SZ294).	ea	--	1	--	--	--	K	K	K	--	--	B–40	41
P	H		5305–021–2357	SCREW: short, top cover (2) brg plate (4) (76040–361SZ297).	ea	--	6	--	--	--	2	3	5	36	60	B–40	3
X1	H		--------------	SCREW: top cover lg (76040–365SB67)	ea	--	2	--	--	--	K	K	K	--	--	B–40	2
P	H		--------------	SCREW: top cover, sealing (76040–361SZ287).	ea	--	2	--	--	--	2	2	2	12	24	B–40	1
P	H		2910–890–2515	SCREW: wire sealing, end cap (2) governor housing (2) (76040–361SZ290).	ea	--	4	--	--	--	2	2	3	24	48	B–40	42
X1	H		--------------	SEAL: operating shaft (76040–361SZ161)	ea	--	1	--	--	--	K	K	K	--	--	B–40	36
X1	H		--------------	SHAFT: operating (for governor model 5037B) (76040–364SB41).	ea	--	1	--	--	--	K	K	K	--	--	B–40	40

X1	H		--------------	SHAFT: operating (for governor model 5749A) (76040-364SB61).	ea	--	1	--	--	--	K	K	K	--	--	B-40	40
X1	H		--------------	SHIM: operating shaft (**Shim Set 76040-215SB86).	--	--	≠	--	--	--	K	K	K	--	--	B-40	32
P	H		2910-890-2533	SPRING: plunger (76040-362SB101) -------	ea	--	1	--	--	--	•	2	2	8	12	B-40	27
P	H		2910-890-2530	SPRING: operating shaft (76040-362SB85) -	ea	--	1	--	--	--	•	2	2	8	12	B-40	31
X1	H		--------------	STUD: control rack (76040-370SB19) ------	ea	--	1	--	--	--	K	K	K	--	--	B-40	24
X1	H		--------------	WASHER: flat, bridge (76040-441SZ318) --	ea	--	2	--	--	--	K	K	K	--	--	B-40	8
X1	H		--------------	WASHER: lock, plate to bridge (76040-441SB42).	ea	--	2	--	--	--	K	K	K	--	--	B-40	10
X1	H		--------------	WASHER: lock, shaft cover screw lower (76040-441SZ364).	ea	--	2	--	--	--	K	K	K	--	--	B-40	38
X1	H		--------------	WASHER: lock, top cover (6) end cap (4) stop cam (1) bridge (2) stud (1) bearing plate (4) housing (9) weight shaft plate (4) (76040-441SZ365).	ea	--	31	--	--	--	K	K	K	--	--	B-40	4
X1	H		--------------	WASHER: stud (76040-441SZ323) -------	ea	--	1	--	--	--	K	K	K	--	--	B-40	23
X1	H		--------------	WEIGHT AND SHAFT ASSEMBLY: (for details see fig. B-41) (for Injection Pump Governor model 5037B) (76040-364SB43).	ea	--	1	--	--	--	K	K	K	--	--	B-40	26
X1	H		--------------	WEIGHT AND SHAFT ASSEMBLY: (for details see fig. B-42) (for Injection Pump Governor model 5749A) (76040-364S[illegible]1).	ea	--	1	--	--	--	K	K	K	--	--	B-40	26
				GOVERNOR MODEL 5037B													
P	H		3110-227-3078	BEARING: ball, rear (76040-22SZ50) ------	ea	--	1	--	--	--	•	2	2	6	10	B-41	4
P	H		3110-990-8234	BEARING, NEEDLE: weight (76040-39SB20).	ea	--	4	--	--	--	2	3	5	24	48	B-41	13
P	H		3110-799-8966	BEARING: sleeve assy (76040-39SB16) ---	ea	--	1	--	--	--	2	2	2	6	12	B-41	11
P	H		3110-155-7445	BEARING: taper roller front (76040-39SB18).	ea	--	1	--	--	--	2	2	2	6	10	B-41	28
X1	H		--------------	DRIVE GEAR ASSEMBLY: (76040-125SB24).	ea	--	1	--	--	--	K	K	K	--	--	B-41	24
				Consists of:													
P	H		--------------	GEAR: drive, 45 teeth (76040-125SB25) --	ea	--	1	--	--	--	•	2	2	6	10	B-41	21
X1	H		--------------	HUB: driving gear (76040-147SB13) ----	ea	--	1	--	--	--	K	K	K	--	--	B-41	19
P	H		2910-890-2529	INSERT: drive gear, rubber (76040-163SB13).	ea	--	1	--	--	--	•	2	2	6	10	B-41	20
P	H		2920-890-2551	RING: drive gear snap (76040-343SB30) --	ea	--	1	--	--	--	•	2	2	6	10	B-41	23
X1	H		--------------	SHIM: drive gear (**Shim Set 76040-215SB86).	--	--	≠	--	--	--	K	K	K	--	--	B-41	22
P	H		--------------	GEAR: driven (15 teeth) (76040-125SB23) --	ea	--	1	--	--	--	•	2	2	6	10	B-41	16
P	H		5310-023-2443	NUT: camshaft rear (76040-261SB27) ------	ea	--	1	--	--	--	•	2	2	6	10	B-41	26
P	H		5310-023-2461	NUT: gear retaining (76040-261SB26) ----	ea	--	1	--	--	--	•	2	2	6	10	B-41	18
P	H		5310-023-2522	NUT: shaft, rear brg (76040-261SB24) ----	ea	--	1	--	--	--	•	2	2	6	10	B-41	2
P	H		2910-890-2525	PIN: weight connecting (76040-311SB30) ---	ea	--	2	--	--	--	2	2	2	12	24	B-41	29

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr.-Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1-20	(b) 21-50	(c) 51-100	(a) 1-20	(b) 21-50	(c) 51-100			(a) Fig. No.	(b) Item or Sym. No.
				0308—ENGINE SPEED GOVERNOR AND CONTROLS—Continued													
X1	H		....	PLATE: brg support (76040–39SB19)	ea	--	1	--	--	--	K	K	K	--	--	B-41	27
X1	H		....	SEAT: shaft spring outer (76040–377SB23)	ea	--	1	--	--	--	K	K	K	--	--	B-41	5
P	H		2910–890–2541	SHAFT: weight (76040–364SB42)	ea	--	1	--	--	--	2	2	3	6	12	B-41	14
X1	H		....	SHIM: inner spring (**SHIM SET 76040–215SB86).	--	--	≠	--	--	--	K	K	K	--	--	B-41	6
X1	H		....	SHIM: outer spring (**SHIM SET 76040–215SB86).	--	--	≠	--	--	--	K	K	K	--	--	B-41	7
X1	H		....	SHIM SET: end cap spring (**SHIM SET 76040–215SB86).	--	--	≠	--	--	--	K	K	K	--	--	B-41	1
X1	H		....	SLEEVE: end cap spring (76040–374SB37)	ea	--	1	--	--	--	K	K	K	--	--	B-41	31
X1	H		....	SLEEVE ASSEMBLY: governor with brg (76040–374SB21).	ea	--	1	--	--	--	K	K	K	--	--	B-41	10
P	H		2910–890–2570	SPRING: governor shaft inner (76040–362SB88).	ea	--	1	--	--	--	*	2	2	8	12	B-41	9
P	H		2910–890–2535	SPRING: governor shaft outer (76040–362SB86).	ea	--	1	--	--	--	*	2	2	8	12	B-41	8
P	H		2910–890–2532	SPRING: end cap (76040–362SB94)	ea	--	1	--	--	--	*	2	2	8	12	B-41	32
P	H		5310–264–1887	WASHER: lock, brg nut rear (76040–441SB43).	ea	--	1	--	--	--	*	2	2	6	10	B-41	3
P	H		5310–023–4349	WASHER: lock, gear nut front (76040–441SZ327).	ea	--	1	--	--	--	*	2	2	6	10	B-41	17
P	H		5310–023–4228	WASHER: lock, camshaft (76040–441SZ339).	ea	--	1	--	--	--	*	2	2	6	10	B-41	25
X1	H		....	WASHER: spacer, driven gear (76040–366SB21).	ea	--	1	--	--	--	K	K	K	--	--	B-41	15
P	H		....	WEIGHT ASSEMBLY: with brg (76040–443SB15).	ea	--	2	--	--	--	*	2	2	6	12	B-41	12
X1	H		....	WASHER: weight assy (**SHIM SET 76040–215SB86).	ea	--	1	--	--	--	K	K	K	--	--	B-41	30
				GOVERNOR MODEL 5749A													
P	H		3110–144–8780	BEARING: ball, front (76040–22SZ52)	ea	--	1	--	--	--	2	2	2	6	10	B-42	14
P	H		3110–060–0597	BEARING: sleeve assy (76040–39SB17)	ea	--	1	--	--	--	2	2	2	6	10	B-42	31
X1	H		....	BUSHING: weight (76040–24SB50)	ea	--	4	--	--	--	K	K	K	--	--	B-42	8

P	H	2910-890-2536	FRICTION CLUTCH AND DRIVE: assy (76040-125SB29).	--	--	--	--	--	--	•	2	2	6	10	B-42	21
			Consists of:													
P	H	2910-890-2455	1 DISK: inner spring (76040-63SB15)	--	--	--	--	--	--	•	2	2	6	10	B-42	25
P	H	2910-890-2528	1 DISK: outer spring (76040-68SB16)	--	--	--	--	--	--	•	2	2	6	10	B-42	27
P	H	2910-890-2527	1 GEAR: drive, 45 teeth (76040-125SB40)	--	--	--	--	--	--	•	2	2	6	10	B-42	23
X1	H		1 HUB: drive gear (76040-147SB20)	--	--	--	--	--	--	K	K	K	--	--	B-42	22
X1	H		1 NUT: drive gear (76040-261SB44)	--	--	--	--	--	--	K	K	K	--	--	B-42	28
X1	H		1 SHIM: inner spring disk spacer .035 (76040-366SB24P1).	--	--	--	--	--	--	K	K	K	--	--	B-42	24
X1	H		≠ SHIM: drive gear adjusting (**SHIM SET 76040-215SB86).	--	--	--	--	--	--	K	K	K	--	--	B-42	26
P	H		GEAR: driven, 15 teeth (76040-125SB23)	ea	--	1	--	--	--	•	•	•	--	10	B-42	17
P	H	5310-023-2443	NUT: camshaft rear (76040-261SB27)	ea	--	1	--	--	--	•	•	•	--	10	B-42	30
P	H	5310-023-2422	NUT: brg plate (76040-261SB25)	ea	--	2	--	--	--	2	2	2	12	16	B-42	12
P	H	5310-023-2461	NUT: gear retaining (76040-261SB26)	ea	--	1	--	--	--	•	•	•	--	--	B-42	19
P	H	2910-890-2534	PIN: weight (76040-311SB76)	ea	--	2	--	--	--	2	2	2	12	18	B-42	10
X1	H		PLATE: brg retainer (76040-305SB44)	ea	--	1	--	--	--	K	K	K	--	--	B-42	13
X1	H		PLATE: brg support (76040-25SB16)	ea	--	1	--	--	--	K	K	K	--	--	B-42	15
P	H		SCREW: brg plate (76040-361SZ29)	ea	--	2	--	--	--	2	2	2	12	20	B-42	20
X1	H		SEAT: outer spring (76040-377SB23)	ea	--	1	--	--	--	K	K	K	--	--	B-42	1
P	H		SHAFT: weight (76040-364SB71)	ea	--	1	--	--	--	•	2	2	6	10	B-42	11
X1	H		SLEEVE ASSEMBLY: governor w/brg (76040-374SB38).	ea	--	1	--	--	--	K	K	K	--	--	B-42	6
X1	H		SHIM: inner spring (**SHIM SET 76040-215SB86).	ea	--	≠	--	--	--	K	K	K	--	--	B-42	2
X1	H		SHIM: outer spring (**SHIM SET 76040-215SB86).	ea	--	≠	--	--	--	K	K	K	--	--	B-42	3
X1	H		SPACER: driven gear (76040-366SB21)	ea	--	1	--	--	--	K	K	K	--	--	B-42	16
P	H		SPRING: inner (76040-362SB141)	ea	--	1	--	--	--	•	2	2	8	12	B-42	5
P	H	2910-890-2526	SPRING: outer (76040-362SB144)	ea	--	1	--	--	--	•	2	2	8	12	B-42	4
P	H	5310-023-4349	WASHER, LOCK: drive gear nut (76040-441SZ327).	ea	--	1	--	--	--	•	•	•	--	--	B-42	18
P	H	5310-023-4228	WASHER, LOCK: drive gear (76040-441SZ339).	ea	--	1	--	--	--	•	2	2	6	10	B-42	29
P	H		WEIGHT ASSEMBLY: w/bushings (76040-443SB21).	ea	--	1	--	--	--	•	2	2	6	12	B-42	7
X1	H		WASHER: weight shim (**SHIM SET 76040-215SB86).	ea	--	≠	--	--	--	K	K	K	--	--	B-42	9
			0309—FUEL FILTERS													
X1	O		BRACKET: mounting (76040-136GB228A)	ea	--	1	K	K	K	K	K	K	--	--	B-43	10
X1	O		FILTER: assy, fuel secondary (76040-483GB319A).	ea	--	1	K	K	K	K	K	K	--	--	B-43	1
			Consists of:													
X1	O		1 CASE: assy filter (76040-6432-59556)	--	--	--	K	K	K	K	K	K	--	--	B-43	7

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0309—FUEL FILTERS—Continued													
X1	O		--------------	1 COVER: filter case (76040–6432–58850).	--	--	--	K	K	K	K	K	K	--	--	B–43	4
P	O		--------------	ELEMENT: filter w/cover gasket (76040–237GB13).	ea	--	1	2	2	3	2	2	3	20	100	B–43	6
P	O		2910–974–7410	GASKET: cover (76040–590GB1229)	ea	--	1	2	2	2	2	2	3	20	100	B–43	5
P	O		5330–805–8849	GASKET: cover screw (76040–6432–37172).	ea	--	1	*	2	2	*	2	2	10	15	B–43	3
P	O		4730–890–2377	PLUG: filter drain (76040–6432–35788–1).	ea	--	1	*	2	2	*	2	2	6	10	B–43	14
P	O		5305–935–7582	SCREW: filter cover, hollow (76040–6432–60483).	ea	--	1	*	2	2	*	2	2	6	10	B–43	2
X1	O		--------------	NUT: 1/4-28 NF, bracket clamping (76040–20AX1).	ea	--	2	K	K	K	K	K	K	--	--	B–43	8
X1	O		--------------	SCREW: 1/4-28 NF x 1 1/4 (76040–1AX147).	ea	--	2	K	K	K	K	K	K	--	--	B–43	13
X1	O		--------------	SCREW: 1/2-13 NC 3 1/4 (76040–4AX56)	ea	--	2	K	K	K	K	K	K	--	--	B–43	12
X1	O		--------------	WASHER: 1/4 lock (76040–36AX1)	ea	--	2	K	K	K	K	K	K	--	--	B–43	9
X1	O		--------------	WASHER: 1/2 lock (76040–36AX5)	ea	--	2	K	K	K	K	K	K	--	--	B–43	11
X1	O		--------------	ELBOW: fuel outlet (76040–63AX310)	ea	--	1	K	K	K	K	K	K	--	--	B–44	9
X1	O		--------------	ELBOW: top cover (76040–63AX305)	ea	--	1	K	K	K	K	K	K	--	--	B–44	4
X1	O		--------------	FILTER ASSEMBLY: primary fuel (76040–483GBA334).	ea	--	1	K	K	K	K	K	K	--	--	B–44	1
				Consists of:													
X1	O		--------------	BRACKET: fuel filter mounting (76040–6432–20330).	--	--	--	K	K	K	K	K	K	--	--	B–44	10
X1	O		--------------	CASE: fuel filter (76040–6432–6662577)	--	--	--	K	K	K	K	K	K	--	--	B–44	8
X1	O		--------------	COVER: top, fuel filter (76040–6432–6662579)	--	--	--	K	K	K	K	K	K	--	--	B–44	5
P	O		2910–974–7445	ELEMENT: fuel filter w/cover gasket (76040–237GB16).	ea	--	1	2	2	3	2	2	3	20	100	B–44	7
P	O		5330–805–8852	GASKET: top cover to case (76040–6432–20509–5).	ea	--	1	*	2	2	*	2	2	10	30	B–44	6
P	O		5330–805–8849	GASKET: top cover screw (76040–6432–37172).	ea	--	1	*	2	2	*	2	2	10	15	B–44	3
P	O		4730–890–2378	PLUG: drain (1) top cover (1) (76040–6432–7600).	ea	--	2	2	2	2	2	2	2	12	24	B–44	11
P	O		5305–935–9582	SCREW: top cover retaining (76040–6432–60483).	ea	--	1	*	2	2	*	2	2	6	10	B–44	2

			0311—ENGINE-STARTING AIDS													
X1	O	....	BRACKET: exciter coil (76040-270GB212)	ea	--	1	K	K	K	K	K	K	--	--	B-45	15
X1	O	....	BRACKET: fuel pump mounting (76040-270GB214).	ea	--	1	K	K	K	K	K	K	--	--	B-45	22
X1	O	....	BRACKET: solenoid mounting (76040-270GB213).	ea	--	1	K	K	K	K	K	K	--	--	B-45	6
X1	O	....	CLAMP: exciter coil to bracket (76040-270GB29).	ea	--	1	K	K	K	K	K	K	--	--	B-45	14
P	O	2940-890-2561	CLAMP: fuel inlet tube (76040-83AX226) ..	ea	--	2	•	2	2	•	2	2	6	10	B-45	3
P	O	4730-974-7588	CONNECTOR: fuel pump outlet hose (76040-63AX329).	ea	--	1	•	2	2	•	2	2	10	10	B-45	21
P	O	4730-977-5584	ELBOW: 1/4 od, pump (1) valve (4) heater (2) (76040-63AX330).	ea	--	7	2	2	2	2	2	2	15	30	B-45	4
P	O	2990-974-7565	GASKET: manifold heater housing (**GASKET SET FSN 2815-890-2362) (76040-590-GB1209).	ea	--	1	•	2	2	•	2	2	10	10	B-45	20
P	O	2590-972-2614	HARNESS: ignition exciter coil (19207-10931908).	ea	--	1	•	2	2	•	2	2	6	10	--	--
P	O	2990-974-7483	HOSE ASSEMBLY, RUBBER: fuel supply (76040-36RUA3117P29).	ea	--	1	•	2	2	•	2	2	10	10	B-45	2
P	O	2990-974-7481	HOSE ASSEMBLY, RUBBER: fuel supply inlet (76040-36RUA3117P8).	ea	--	1	•	2	2	•	2	2	10	10	B-45	27
P	O	2990-974-7480	HOSE ASSEMBLY, RUBBER: heater pump outlet (76040-36RUA3117P18).	ea	--	1	•	2	2	•	2	2	10	10	B-45	9
P	O	2990-974-7479	HOSE ASSEMBLY, RUBBER: overflow solenoid outlet (1) inlet (1) (76040-36RUA3117P10).	ea	--	2	•	2	2	•	2	2	10	20	B-45	1
P	O	2910-890-2550	INSULATOR: exciter coil (76040-41GC112).	ea	--	1	•	2	2	•	2	2	6	10	B-45	13
P	O	2990-974-7443	MANIFOLD HEATER: kit, complete (76040-255GB43).	ea	--	1	•	2	2	•	2	2	10	10	B-45	5
			Consists of:													
X1	O	....	AIR HEATER HOUSING: complete (76040-255GBA34).	ea	--	1	K	K	K	K	K	K	--	--	B-45	5.2
			Consists of:													
P	O	5330-298-0091	GASKET: spark plug (150190)	ea	--	1	2	3	5	2	3	5	30	60	B-45	5.5
			1 HOUSING: manifold heater (76040-255GB16).	--	--	--	--	--	--	--	--	--	--	--	B-45	5.4
P	O	2910-974-9676	NOZZLE: manifold heater (76040-115GC16).	ea	--	1	•	2	2	•	2	2	10	10	B-45	5.3
P	O	2920-974-7453	SPARK PLUG: manifold heater (76040-268GC1118).	ea	--	1	2	2	3	2	2	3	20	40	B-45	5.6
P	O	2990-974-7605	ELECTRIC SOLENOID VALVE: (76040-689GC21).	ea	--	2	•	2	2	•	2	2	10	20	B-45	5.1
P	O	2910-974-7470	FUEL PUMP: electric (for details see figs. B-46 and B-47) (76040-332GC31).	ea	--	1	•	2	2	•	2	2	10	10	B-45	5.9

(1) Source, Maint. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0311—ENGINE-STARTING AIDS—Continued													
P	O		2990-974-7402	IGNITION EXCITER COIL: (76040-10MJ311).	ea	--	1	•	2	2	•	2	2	10	12	B–45	5.8
P	O		2990-974-7512	LEAD, ELECTRICAL: (76040–44M0223)	ea	--	1	•	2	2	•	2	2	10	20	B–45	5.7
X1	O		....	NUT: 1/4-28 NF (76040–20AX1)	ea	--	3	K	K	K	K	K	K	--	--	B–45	17
X1	O		....	NUT: 7/16-20 NF (76040–20AX4)	ea	--	2	K	K	K	K	K	K	--	--	B–45	24
X1	O		....	NUT: #10–32 NF, pump to bracket (76040-53AX6).	ea	--	2	K	K	K	K	K	K	--	--	B–45	23
P	O		2910-974-7581	REDUCER: nozzle to elbow (76040-63AX1221).	ea	--	1	•	•	•	•	•	•	5	•	B–45	10
X1	O		....	SCREW: 1/4-28 NF x 5/8 (76040–1AX8)	ea	--	2	K	K	K	K	K	K	--	--	B–45	19
X1	O		....	SCREW: 1/4-28 NF x 1 3/4 (76040–1AX30)	ea	--	1	K	K	K	K	K	K	--	--	B–45	18
P	O		5305-021-1568	SCREW: 5/16-18 NC x 5/8 (76040–4AX76)	ea	--	4	2	2	3	2	2	3	24	24	B–45	12
X1	O		....	SCREW: #–32 NF x 3/8 (76040–9AX21)	ea	--	4	K	K	K	K	K	K	--	--	B–45	8
X1	O		....	SCREW: #10–32 NF x 3/4 (76040–9AX72)	ea	--	2	K	K	K	K	K	K	--	--	B–45	26
X1	O		....	WASHER: 1/4 lock (76040–36AX1)	ea	--	3	K	K	K	K	K	K	--	--	B–45	16
X1	O		....	WASHER: 7/16 lock (76040–36AX4)	ca	--	2	K	K	K	K	K	K	--	--	B–45	25
X1	O		....	WASHER: #10 lock (76040–36AX76)	ea	--	6	K	K	K	K	K	K	--	--	B–45	7
P	O		5310-023-4161	WASHER: 5/16 plain (76040–37AX1)	ea	--	4	2	2	3	2	2	3	24	24	B–45	11
X1	F		....	PUMP ASSEMBLY: (51663–RG16705–3)	ea	--	1	K	K	K	K	K	K	--	--	B–46	1
				Consists of:													
X1	F		....	BASE: (51663–RG16245–1)	ea	--	1	K	K	K	K	K	K	--	--	B–46	5
X1	F		....	GEAR AND HOUSING ASSEMBLY: (51663–RB16232).	ea	--	1	K	K	K	K	K	K	--	--	B–46	8
X1	F		....	GEAR SHAFT: (51663–RD16713–1)	ea	--	1	K	K	K	K	K	K	--	--	B–46	11
X1	F		....	GEAR: (51663–RB16708–1)	ea	--	1	K	K	K	K	K	K	--	--	B–46	10
X1	F		....	HOUSING: (51663–RD16847)	ea	--	1	K	K	K	K	K	K	--	--	B–46	12
X1	F		....	HOUSING: (51663–RB16851)	ea	--	1	K	K	K	K	K	K	--	--	B–46	9
X1	F		....	NUT: (88044–316–5R)	ea	--	1	K	K	K	K	K	K	--	--	B–46	18
X1	F		....	PACKING: PREFORMED: (96906-29513–5).	ea	--	1	K	K	K	K	K	K	--	--	B–46	16
X1	F		....	PACKING, PREFORMED: (96906-29513–21).	ea	--	2	K	K	K	K	K	K	--	--	B–46	7
X1	F		....	RING: (79136–5005–43–S–MD)	ea	--	1	K	K	K	K	K	K	--	--	B–46	8
X1	F		....	SCREW: (51663–RB16707)	ea	--	1	K	K	K	K	K	K	--	--	B–46	17
X1	F		....	SCREW: (51663–RA17127)	ea	--	2	K	K	K	K	K	K	--	--	B–46	6
X1	F		....	SCREW: (51663–RA17126)	ea	--	4	K	K	K	K	K	K	--	--	B–46	13

X1	F		------------	SEAL: (71724-012-0406-0085BW)	ea	--	1	K	K	K	K	K	K	--	--	B-46	4
X1	F		------------	SEAL: (71724-015-075-8BW)	ea	--	1	K	K	K	K	K	K	--	--	B-46	2
X1	F		------------	SPRING: (51663-RA16716)	ea	--	1	K	K	K	K	K	K	--	--	B-46	15
X1	F		------------	VALVE: (51663-RB17708)	ea	--	1	K	K	K	K	K	K	--	--	B-46	14
X1	F		------------	MOTOR ASSEMBLY: fuel pump (25140-RD16701-1).	ea	--	1	K	K	K	K	K	K	--	--	B-47	1
				Consists of:													
X1	F		------------	ARMATURE: fuel pump (25140-7A2326)	ea	--	1	K	K	K	K	K	K	--	--	B-47	25
X1	F		------------	BEARING: armature shaft front (25140-15D023A056).	ea	--	1	K	K	K	K	K	K	--	--	B-47	27
X1	F		------------	BEARING: armature shaft rear (25140-15D1009).	ea	--	1	K	K	K	K	K	K	--	--	B-47	24
X1	F		------------	BRUSH: (25140-40D1275)	ea	--	2	K	K	K	K	K	K	--	--	B-47	34
X1	F		------------	CAPACITOR: (25140-40D1511)	ea	--	1	K	K	K	K	K	K	--	--	B-47	11
X1	F		------------	CHOKE: (25140-40D1473)	ea	--	1	K	K	K	K	K	K	--	--	B-47	10
X1	F		------------	CONNECTOR: (96906-3102R10SL-4P)	ea	--	1	K	K	K	K	K	K	--	--	B-47	5
X1	F		------------	COVER: (25140-4D1568)	ea	--	1	K	K	K	K	K	K	--	--	B-47	7
X1	F		------------	END BELL ASSEMBLY: (25140-11AG55).	ea	--	1	K	K	K	K	K	K	--	--	B-47	14
				Consists of:													
X1	F		------------	BUS BAR: (25140-40D1545)	ea	--	1	K	K	K	K	K	K	--	--	B-47	35
X1	F		------------	END BELL ASSEMBLY: (25140-33D1075).	ea	--	1	K	K	K	K	K	K	--	--	B-47	17
X1	F		------------	SCREW: (88044-515-4-3)	ea	--	2	K	K	K	K	K	K	--	--	B-47	15
X1	F		------------	TERMINAL: (25140-32D617)	ea	--	1	K	K	K	K	K	K	--	--	B-47	36
X1	F		------------	TERMINAL: (25140-32D753)	ea	--	1	K	K	K	K	K	K	--	--	B-47	16
X1	F		------------	WIRE: (25140-40D944-B3-1/2)	ft	--	≠	K	K	K	K	K	K	--	--	B-47	38
X1	F		------------	WIRE: (25140-40D944-A3-1/2)	ft	--	≠	K	K	K	K	K	K	--	--	B147	37
X1	F		------------	FRAME: (25140-33D1076)	ea	--	1	K	K	K	K	K	K	--	--	B-47	30
X1	F		------------	GASKET: frame (25140-RA16856)	ea	--	1	K	K	K	K	K	K	--	--	B-47	31
X1	F		------------	GASKET: connector (25140-9D1345)	ea	--	1	K	K	K	K	K	K	--	--	B-47	6
X1	F		------------	INSULATOR: (25140-901348)	ea	--	1	K	K	K	K	K	K	--	--	B-47	9
X1	F		------------	INSULATOR: (25140-9D1406)	ea	--	1	K	K	K	K	K	K	--	--	B-47	18
X1	F		------------	MAGNET: (25140-29D538-2)	ea	--	2	K	K	K	K	K	K	--	--	B-47	29
X1	F		------------	PACKING: frame to end ball (25140-9D1347).	ea	--	1	K	K	K	K	K	K	--	--	B-47	28
X1	F		------------	PACKING: insulator (25140-9D1425)	ea	--	1	K	K	K	K	K	K	--	--	B-47	23
X1	F		------------	PLATE: (25140-17D1992)	ea	--	2	K	K	K	K	K	K	--	--	B-47	8
X1	F		------------	SCREW: (96906-35223-12)	ea	--	2	K	K	K	K	K	K	--	--	B-47	22
X1	F		------------	SCREW: (88044-515-4-12)	ea	--	2	K	K	K	K	K	K	--	--	B-47	12
X1	F		------------	SCREW: (96906-35223-15)	ea	--	2	K	K	K	K	K	K	--	--	B-47	3
X1	F		------------	SCREW: (25140-1D1059)	ea	--	2	K	K	K	K	K	K	--	--	B-47	2
X1	F		------------	SEAL: (25140-9D947)	ea	--	4	K	K	K	K	K	K	--	--	B-47	4
X1	F		------------	SHIM: (25140-21D635)	ea	--	≠	K	K	K	K	K	K	--	--	B-47	19
X1	F		------------	SHIM: (25140-21D636)	ea	--	≠	K	K	K	K	K	K	--	--	B-47	21
X1	F		------------	SHIM: (25140-21D637)	ea	--	≠	K	K	K	K	K	K	--	--	B-47	23

(1) Source, Maint. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0311—ENGINE-STARTING AIDS—Continued													
X1	F		....	SPACER: (25140-19D1154)	ea	--	1	K	K	K	K	K	K	--	--	B-47	26
X1	F		....	SPRING: (25140-10D691)	ea	--	1	K	K	K	K	K	K	--	--	B-47	33
X1	F		....	SPRING: (25140-10D612)	ea	--	1	K	K	K	K	K	K	--	--	B-47	20
X1	F		....	WASHER: (25140-A21D632-2)	ea	--	2	K	K	K	K	K	K	--	--	B-47	13
				GROUP 05—COOLING SYSTEM 0503—WATER MANIFOLD, HEADERS, THERMOSTATS, AND HOUSING GASKETS													
X1	O		....	BRACKET: radiator top brace (76040-80MF278).	ea	--	1	K	K	K	K	K	K	--	--	B-48	3
P	O		5340-020-6701	CLAMP: bypass hose (76040-83AX452)	ea	--	2	•	2	2	•	2	2	6	10	B-48	24
X1	O		....	ELBOW: bleeder hose (76040-63AX878)	ea	--	1	K	K	K	K	K	K	--	--	B-48	22
P	O		2930-890-2555	FITTING: thermostat bypass (76040-493GB163).	ea	--	1	•	2	2	•	2	2	6	10	B-48	25
X1	O		....	GASKET: thermostat housing (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) 76040-590GB1134)	ea	--	1	K	K	K	K	K	K	--	--	B-48	5
P	O		2930-974-7572	GASKET: water outlet manifold (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-605GB11B).	ea	--	4	2	3	6	2	3	6	40	40	B-48	8
P	O		2930-974-7484	HOSE: assy, bleeder outlet (76040-36RUA-3113P6).	ea	--	1	•	2	2	•	2	2	10	20	B-48	28
P	O		2930-974-7525	HOSE: assy, bypass preformed (76040-493GB2158).	ea	--	1	2	2	3	2	2	3	20	100	B-48	23
X1	O		....	HOUSING: thermostat (76040-439GB386)	ea	--	1	K	K	K	K	K	K	--	--	B-48	4
X1	O		....	MANIFOLD: water outlet (front) (76040-107GC489).	ea	--	1	K	K	K	K	K	K	--	--	B-48	9
X1	O		....	MANIFOLD: water outlet (rear) (76040-107GC218).	ea	--	1	K	K	K	K	K	K	--	--	B-48	13
X1	O		....	PLUG: 3/8 NPT (76040-63AX45)	ea	--	1	K	K	K	K	K	K	--	--	B-48	18
X1	O		....	PLUG: 1/2 NPT (76040-63AX1)	ea	--	1	K	K	K	K	K	K	--	--	B-48	11
P	O		5305-021-1343	SCREW: 3/8-16 NC x 1 (76040-4AX1)	ea	--	4	2	2	3	2	2	3	24	24	B-48	17
P	O		....	SCREW: 3/8-16 NC x 2 3/4 (76040-4AX169)	ea	--	6	2	2	2	2	2	2	12	12	B-48	16

X1	O		-------------	SCREW: 3/8-16 NC x 2 1/4 (76040-4AX124)	ea	--	2	K	K	K	K	K	K	--	--	B-48	1
P	O		-------------	SCREW: 3/8-16 NC x 3 (76040-4AX167)	ea	--	2	•	2	2	•	2	2	6	10	B-48	20
P	O		2930-974-7517	SEAL: manifold tube (**GASKET SET FSN 2815-890-2362) (76040-447GC148).	ea	--	2	2	2	3	2	2	3	20	40	B-48	10
P	O		2930-890-2553	SEAL: thermostat (**GASKET SETS FSN 2815-890-2362 and 2815-890-2348) (76040-447GC146).	ea	--	1	2	3	4	2	3	4	12	100	B-48	6
P	O		2930-890-2554	SEAL: themostat bypass fitting (**GASKET SET FSN 2815-890-2362) (76040-446GC155).	ea	--	1	•	2	2	•	2	2	8	100	B-48	26
P	O		5305-935-7584	STUD: water manifold (76040-18AX1074)	ea	--	2	2	2	2	2	2	2	12	24	B-48	21
P	O		4730-974-7589	TEE: bleeder outlet (76040-63AX532)	ea	--	1	•	2	2	•	2	2	10	10	B-48	27
P	O		6620-974-7595	THERMOSTAT: water (170°) (76040-657GC225AP2).	ea	--	1	•	2	2	•	2	2	10	20	B-48	7
X1	O		-------------	TUBE: water manifold connector (76040-227GC157).	ea	--	1	K	K	K	K	K	K	--	--	B-48	12
P	O		6685-803-2367	UNIT: temperature sending (76040-64MT127).	ea	--	1	2	2	3	2	2	3	6	10	B-48	14
P	O		5310-732-3232	WASHER: 3/8 plain (76040-37AX7)	ea	--	10	2	3	5	2	3	5	30	70	B-48	15
P	O		5310-736-1819	WASHER: 5/8 plain (76040-37AX256)	ea	--	2	2	2	2	2	2	2	12	24	B-48	2
X1	O		-------------	WASHER: .391 plain (76040-37AX2)	ea	--	2	K	K	K	K	K	K	--	--	B-48	19
				0504—WATER PUMP													
P	O		4730-890-2371	ADAPTER: air compressor coolant hose (76040-63AX1842).	ea	--	1	•	2	2	•	2	2	6	10	B-49	7
P	O		4730-890-2373	CONNECTOR: air compressor coolant return hose (76040-63AX308).	ea	--	1	•	2	2	•	2	2	6	10	B-49	8
P	O		4730-890-2372	ELBOW: air compressor coolant hose at cyl (76040-63AX1214).	ea	--	1	•	2	2	•	2	2	6	10	B-49	12
P	O		4730-977-5584	ELBOW: manifold bypass (76040-63AX330).	ea	--	1	•	2	2	•	2	2	6	10	B-49	2
P	O		4730-890-2380	ELBOW: oil cooler return (76040-63AX440)	ea	--	1	•	2	2	•	2	2	6	10	B-49	3
P	O		5330-974-7543	GASKET: water pump mounting (**GASKET SET FSN 2815-890-2362- (76040-56AX107).	ea	--	1	•	2	2	•	2	2	10	10	B-49	13
P	O		2930-974-7489	HOSE: assy, air compressor coolant inlet (76040-36RUA3132P9).	ea	--	1	2	2	3	2	2	3	6	10	B-49	10
P	O		2930-974-7488	HOSE: assy, air compressor coolant return (76040-36RUA3132P46).	ea	--	1	•	2	2	•	2	2	10	10	B-49	11
P	O		2930-974-7485	HOSE: assy, air vent (76040-36RUA3117P9).	ea	--	1	•	2	2	•	2	2	10	10	B-49	1
P	F	R	2930-890-2556	PUMP: water assy (for details see fig. B-50) (76040-316GCA3155).	ea	--	1	K	K	K	K	K	K	--	--	B-49	4
P	O		5305-048-6417	SCREW, CAP, HEXAGON HEAD: 1/2-13 NC x 1 1/2 inlet (96906-MS35297-113).	ea	--	2	2	2	2	2	2	2	12	12	B-49	9

(1) Source, Main. and Recov. Code			(2)	(3)	(4)	(5)	(6)	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9)	(10)	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.	Federal Stock Number	Description	Unit of Issue	Qty Inc in Unit Pack	Qty Inc in Unit	(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100	1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	Depot Maint. Alw. Per 100 Equip.	(a) Fig. No.	(b) Item or Sym. No.
				0504—WATER PUMP—Contniued													
P	O		2930-890-2552	SCREW, CAP HEXAGON HEAD: 1/3 NC x 4 water pump mounting (76040-4AX133).	ea	--	1	*	2	2	*	2	2	6	10	B-49	6
P	O		5310-023-4374	WASHER: 1/2 lock (76040-36AX5)	ea	--	3	2	2	2	2	2	2	12	20	B-49	5
P	O		2930-974-7549	GASKET: water pump inlet (**GASKET set FSN 2815-890-2362 (76040-56AX392).	ea	--	2	2	3	5	2	3	5	20	200	--	--
X1	F		--------------	HOUSING: water pump (76040-771GB472)	ea	--	1	K	K	K	K	K	K	--	--	B-50	1
X1	F		--------------	HUB: pump pulley (76040-786GB148)	ea	--	1	K	K	K	K	K	K	--	--	B-50	8
P	F		2930-974-7466	PUMP: water complete, service assy (76040-316GCA260).	ea	--	1	2	2	3	2	2	3	10	35	B-50	2
				Composed of:													
P	F		2520-692-5887	BREATHER: grease pocket (76040-541KB15).	ea	--	1	*	2	2	*	2	2	10	10	B-50	5
X1	F		--------------	1 COVER: water pump (76040-360GB339).	--	--	--	K	K	K	K	K	K	--	--	B-50	7
P	F		2930-974-7494	IMPELLER: water pump (76040-379GC245D).	ea	--	1	*	*	*	*	*	*	4	*	B-50	4
P	F		2930-974-7465	KIT: repair, water pump (76040-316GCA1158).	ea	--	1	2	2	3	2	2	3	10	35	B-50	3
				Composed of:													
P	F		3110-107-7563	BEARING: shaft, front (76040-46AX452).	ea	--	1	*	2	2	*	2	2	8	12	B-50	3.8
P	F		3110-100-2365	BEARING: shaft, rear (76040-46AX451).	ea	--	1	*	2	2	*	2	2	8	12	B-50	3.6
X1	F		--------------	1 GASKET: pump cover (**GASKET SET FSN 2815-890-2362) (76040-610GB216).	--	--	--	K	K	K	K	K	K	--	--	B-50	3.1
X1			--------------	1 KEY: 3/16 x 3/16 x 9/16 pump hub (76040-42AX28).	--	--	--	K	K	K	K	K	K	--	--	B-50	3.4
X1			--------------	1 RETAINER: shaft brg (76040-325GB131).	--	--	--	K	K	K	K	K	K	--	--	B-50	3.9
X1			--------------	1 SEAL: pump shaft (76040-47GB145A)	--	--	--	K	K	K	K	K	K	--	--	B-50	3.2
X1	F		--------------	1 SEAL: pump rear brg (76040-446GC1108)	--	--	--	K	K	K	K	K	K	--	--	B-50	3.7
P	F		2930-890-2557	SHAFT: water pump (76040-469GC191C).	ea	--	1	*	2	2	*	2	2	6	10	B-50	3.3

X1	F		-------------	1 SLINGER: pump shaft (76040-518GC113).	--	--	--	K	K	K	K	K	K	--	--	B-50	3.5
X1	F		-------------	PLUG: 1/4 NPT sq hd, water pump cover (76040-63AX4).	--	--	--	K	K	K	K	K	K	--	--	B-50	15
X1	F		-------------	REDUCER: grease pocket breather (76040-63AX1221).	--	--	--	K	K	K	K	K	K	--	--	B-50	6
X1	F		-------------	1 SPACER: brg ctr (76040-550GC148) ---	--	--	--	K	K	K	K	K	K	--	--	B-50	8
P	F		5310-974-7439	NUT: special, light thin stop 3/4-16 (76040-21AX639).	ea	--	1	•	2	2	•	2	2	6	10	B-50	9
X1	F		-------------	PLUG: 1/4 NPT sq hd, water pump body (76040-63AX4).	ea	--	1	K	K	K	K	K	K	--	--	B-50	17
P	F		2930-974-7454	PULLEY: fan and hub (76040-302GC2187A).	ea	--	1	•	2	2	•	2	2	6	10	B-50	12
P	F		5305-021-1568	SCREW: cap, hex hd 5/16-18 NC x 5/8 (76040-4AX76).	ea	--	7	2	4	7	2	4	7	60	60	B-50	13
P	F		5305-018-0121	SCREW: cap, hex hd 3/8-16 NC x 7/8 (76040-4AX58).	ea	--	6	2	4	7	2	4	7	60	60	B-50	10
P	F		4730-769-7787	VALVE: water drain (76040-61AX57) ----	ea	--	1	•	2	2	•	2	2	10	10	B-50	16
P	F		5310-974-7478	WASHER: lock, 3/8 medium (76040-36AX3).	ea	--	6	2	4	7	2	4	7	60	60	B-50	11
X1	F		-------------	WASHER: plain 5/16 (76040-37AX1) ------	ea	--	7	K	K	K	K	K	K	--	--	B-50	14
				0505—FAN ASSEMBLY													
P	O		3030-974-7628	BELT SET: matched fan (76040-88GB165) -	ea	--	1	3	6	9	3	6	9	40	100	B-51	1
P	O		2930-974-7448	FAN: engine cooling (76040-22MH414P56) --	ea	--	1	•	•	•	•	•	•	4	•	B-51	2
				GROUP 06—ELECTRICAL SYSTEM													
				0601—GENERATOR, ALTERNATOR													
X1	O		-------------	BRACKET: generator mount (76040-3MJ3114)	ea	--	1	K	K	K	K	K	K	--	--	B-52	18
P	O	R	2920-293-4380	GENERATOR, ENGINE ACCESSORY: assy (opt w/GENERATOR ASSY FSN 2920-903-9534) (refer to TM 9-2920-214-35 for component parts) (Delco Remy) (7355736).	ea	--	1	2	3	5	2	3	5	10	10	B-52	16
P	O	R	2920-903-9534	GENERATOR, ENGINE ACCESSORY: assy (opt w/GENERATOR ASSY FSN 2920-293-4380) (refer to TM 9-2920-247-34 for component parts) (Prestolite) (10950808).	ea	--	1	2	2	3	2	2	3	6	10	B-52	16
P	O		5315-010-3905	KEY, WOODRUFF: pulley to armature (103905).	ea	--	1	•	2	2	•	2	2	6	10	B-52	10
X1	O		-------------	LINK: generator adjusting (76040-4MJ1105).	ea	--	1	K	K	K	K	K	K	--	--	B-52	1
X1	O		-------------	NUT: lock 7/16-20 NF generator mounting (76040-21AX673).	ea	--	2	K	K	K	K	K	K	--	--	B-52	12

(1) Source, Maint. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				0601—GENERATOR, ALTERNATOR—Continued													
P	O		5310-235-5636	NUT, SELF-LOCKING, HEXAGON: 1/2 pulley to armature (used w/GENERATOR ASSY FSN 2920-737-4750) (96906-20364-820C).	ea	--	1	*	2	2	*	2	2	6	10	B-52	6
P	O		5310-655-9497	NUT, CASTELLATED, HEXAGON: 1/2 pulley to armature (used w/GENERATOR ASSY FSN 2920-735-5736) (96906-35692-825).	ea	--	1	*	2	2	*	2	2	6	8	B-52	6
X1	O		-------------	WASHER, LOCK: 1/2 (used w/GENERATOR ASSY FSN 2920-735-5736) (120834).	ea	--	1	K	K	K	K	K	K	--	--	B-52	7
X1	O		-------------	WASHER, LOCK: 1/2 medium (76040-36AX5).	ea	--	3	K	K	K	K	K	K	--	--	B-52	14
X1	O		-------------	WASHER, PLAIN: 3/8 adjusting link screw (76040-37AX138).	ea	--	2	K	K	K	K	K	K	--	--	B-52	2
				0603—STARTING MOTOR													
P	O		-------------	SCREW, CAP, HEXAGON HEAD: 5/8-11 NC x 2 (76040-4AX43).	ea	--	3	2	2	3	2	2	3	18	30	B-53	2
P	O	RF	2920-267-9967	STARTER, ENGINE ELECTRICAL: assy (opt w/STARTER FSN 2920-226-6545 and FSN 2920-999-6216) (refer to TM 9-2920-243-35 for component parts) (Leece-Neville) (10935876).	ea	--	1	2	2	3	2	2	3	6	10	B-53	1
P	O	RF	2920-226-6545	STARTER, ENGINE ELECTRICAL: assy (opt w/STARTER FSN 2920-267-9967 and FSN 2920-999-6216) (refer to TM 9-2920-243-35 for component parts) (Delco Remy) (10911018-1).	ea	--	1	2	2	3	2	2	3	6	10	B-53	1
P	O	RF	2920-999-6216	STARTER, ENGINE ELECTRICAL: assy (opt w/STARTER FSN 2920-226-6545 and FSN 2920-267-9967) (refer to TM 9-2920-222-34 for component parts) (Prestolite (10951385-1).	ea	--	1	2	2	3	2	2	3	6	10	B-53	1
P	O		5310-010-3325	WASHER, LOCK: 5/8 medium (96906-35338-12).	ea	--	3	2	2	3	2	2	3	18	30	B-53	3

GROUP 12

1200—AIR COMPRESSOR ASSEMBLY

P	F		2530-890-2363	REPAIR KIT: air compressor field (76040-745-229416).	ea	--	1	2	2	2	2	2	2	12	40	B-55	--
				Composed of:													
X1	F		....	1 GASKET: cyl head (76040-745-236571).	--	--	--	K	K	K	K	K	K	--	--	B-55	3
X1	F		....	2 GASKET: discharge fitting (76040-745-56AX1).	--	--	--	K	K	K	K	K	K	--	--	B-55	24
X1	F		....	2 GUIDE: inlet valve (76040-745-239396).	--	--	--	K	K	K	K	K	K	--	--	B-57	2
X1	F		....	2 SPRING: discharge valve (76040-745-210468).	--	--	--	K	K	K	K	K	K	--	--	B-56	2
X1	F		....	2 SPRING: inlet valve (76040-745-236126).	--	--	--	K	K	K	K	K	K	--	--	B-57	1
P	F		2530-890-2364	UNLOADER KIT: inlet valve (76040-745-279614).	ea	--	1	2	2	2	2	2	2	12	24	B-55	--
				Composed of:													
X1	F		....	1 GASKET: inlet (76040-590GB1146)	--	--	--	K	K	K	K	K	K	--	--	B-55	19
X1	F		....	2 GUIDE: unloader plunger (76040-745-240022).	--	--	--	K	K	K	K	K	K	--	--	B-57	6
X1	F		....	2 PISTON: assy, unloader (76040-745-229875).	--	--	--	K	K	K	K	K	K	--	--	B-57	11
X1	F		....	2 PLUNGER: unloader (76040-745-240023).	--	--	--	K	K	K	K	K	K	--	--	B-57	6
X1	F		....	1 SADDLE, SPRING: unloader (76040-745-240025).	--	--	--	K	K	K	K	K	K	--	--	B-57	20
X1	F		....	1 SEAT, SPRING: unloader (76040-745-238491).	--	--	--	K	K	K	K	K	K	--	--	B-57	22
X1	F		....	1 SPRING: unloader (76040-745-239972).	--	--	--	K	K	K	K	K	K	--	--	B-57	21
X1	F		....	2 VALVE: discharge (76040-745-203102).	--	--	--	K	K	K	K	K	K	--	--	B-56	3
X1	F		....	2 VALVE: inlet (76040-745-236125)	--	--	--	K	K	K	K	K	K	--	--	B-57	3
X1	F		....	ADAPTER: compressor to block (76040-23GB28).	ea	--	1	K	K	K	K	K	K	--	--	B-54	9
P	F	R	2530-974-7456	COMPRESSOR: air, assy (for details see figs. B-55, 56, 57 & 58) (76040-303GB4122).	ea	--	1	•	2	2	•	2	2	10	10	B-54	7
P	F		2530-974-7563	GASKET: steering pump to housing (**GASKET SET FSN 2815-890-2362) (76040-590GB1205).	ea	--	1	•	2	2	•	2	2	10	100	B-54	4
P	F		2530-974-7564	GASKET: steering pump housing to compressor (**GASKET SET FSN 2815-890-2362) (76040-590GB1222).	ea	--	1	•	2	2	•	2	2	10	20	B-54	6

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				1209—AIR COMPRESSOR ASSEMBLY—Continued													
P	F		5330–974–7537	GASKET: air compressor mounting (**GASKET SET FSN 2815–890–2362) (76040–541GB18).	ea	--	1	*	2	2	*	2	2	10	10	B–54	8
P	F		2815–104–4394	GASKET: adapter to engine block (**GASKET SET FSN 2815–890–2362) (76040–541GB18).	ea	--	1	*	2	2	*	2	2	10	20	B–54	10
X1	F		--------------	HOUSING: steering pump to compressor (76040–756GB43).	ea	--	1	K	K	K	K	K	K	--	--	B–54	5
P	O		5310–023–2743	NUT: 1/2-20 NF (76040–21AX785)	ea	--	3	2	2	3	2	2	3	18	36	B–54	18
																B–54	3
				PUMP: steering gear, hyd, Model VTM 27–60–45–10–MO–LI–10–S8 (see Group 1410, fig. B–59 for details).	--	--	--	--	--	--	--	--	--	--	--		
				PUMP: steering gear, hyd, Model VTM 27–60–45–10–MO–LI–12–S8 (see Group 1410, fig. B–60 for details).	ea	--	--	--	--	--	--	--	--	--	--	B–54	8
P	F		5305–021–1565	SCREW: 5/16-18 NC x 1 housing to compressor (76040–4AX5).	ea	--	4	2	2	3	2	2	3	24	24	B–54	15
P	F		5305–021–1372	SCREW: 3/8-16 NC x 1 1/4 steering pump to housing (76040–4AX16).	ea	--	2	2	2	2	2	2	2	12	24	B–54	1
X1	F		--------------	STUD: 1/2-20 NF x 1/2-13 NC special, compressor to block (76040–18AX1035).	ea	--	3	K	K	K	K	K	K	--	--	B–54	11
							2	*	2	2	*	2	2	10	20	B–54	2
P	F		5310–974–7478	WASHER: 3/8 lock (76040–36AX3)	ea	--	4	2	2	3	2	2	3	24	24	B–54	14
P	F		5310–023–3524	WASHER: 5/16 lock (76040–36AX22)	ea	--	3	K	K	K	K	K	K	--	--	B–54	12
X1	F		--------------	WASHER: 1/2 plain (76040–37AX88)	ea	--	1	K	K	K	K	K	K	--	--	B–55	20
X1	F		--------------	BLOCK: cyl, air compressor (for details see fig. B–57).	ea	--											
							1	K	K	K	K	K	K	--	--	B–55	8
X1	F		--------------	COUPLING: air compressor driving (76040–320GB11A).	ea	--	1	K	K	K	K	K	K	--	--	B–55	12
X1	F		--------------	COVER: crankcase (76040–745–202877)	ea	--	1	K	K	K	K	K	K	--	--	B–55	6
X1	F		--------------	CRANKCASE: air compressor (for details see fig. B–58).	ea	--	1	K	K	K	K	K	K	--	--	B–55	23
X1	F		--------------	FITTING: air compressor discharge (76040–103QE127).	ea	--	1	K	K	K	K	K	K	--	--	B–55	18
X1	F		--------------	FLANGE: air compressor intake (76040–71RU11639A).	ea	--											

X1	F		....	GASKET: crankcase cover (76040-745-202597).	ea	--	1	K	K	K	K	K	K	--	--	B-55	11
X1	F		....	GASKET: cyl block (**REPAIR KIT 76040-745-229416) (76040-745-202898).	ea	--	1	K	K	K	K	K	K	--	--	B-55	15
X1	F		....	GASKET: cyl head (**REPAIR KIT 76040-745-229416) (76040-745-236571).	ea	--	1	K	K	K	K	K	K	--	--	B-55	3
X1	F		....	GASKET: discharge fitting (**REPAIR KIT 76040-745-229416) (76040-745-56AX1).	ea	--	2	K	K	K	K	K	K	--	--	B-55	24
X1	F		....	GASKET: inlet flange (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-590GB1146).	ea	--	1	K	K	K	K	K	K	--	--	B-55	19
X1	F		....	HEAD: cyl, air compressor (for details see fig. B-56).	ea	--	1	K	K	K	K	K	K	--	--	B-55	2
X1	F		....	KEY: drive coupling (76040-745-232012) ...	ea	--	1	K	K	K	K	K	K	--	--	B-55	7
X1	F		....	NUT: drive coupling (76040-745-208395) ...	ea	--	1	K	K	K	K	K	K	--	--	B-55	10
X1	F		....	SCREW: block to crankcase (76040-745-212935).	ea	--	6	K	K	K	K	K	K	--	--	B-55	4
X1	F		....	SCREW: crankcase cover (76040-745-203117).	ea	--	6	K	K	K	K	K	K	--	--	B-55	14
X1	F		....	SCREW: cyl head to block (76040-745-237317).	ea	--	8	K	K	K	K	K	K	--	--	B-55	1
X1	F		....	SCREW: 5/16-18 NC x 1 3/4 discharge fitting (76040-4AX45).	ea	--	2	K	K	K	K	K	K	--	--	B-55	21
P	F		5305-021-1565	SCREW: 5/16-18 NC x 1 inlet flange to block (76040-4AX5).	ea	--	2	2	2	2	2	2	2	12	16	B-55	16
P	F		5310-023-2714	WASHER: flat, inlet flange screw (76040-37AX68).	ea	--	2	2	2	2	2	2	2	12	16	B-55	22
X1	F		....	WASHER: lock, coupling (76040-83GC11) ..	ea	--	1	K	K	K	K	K	K	--	--	B-55	9
X1	F		....	WASHER: 1/4 lock, crankcase cover (76040-8AX1).	ea	--	6	K	K	K	K	K	K	--	--	B-55	13
X1	F		....	WASHER: 5/16 lock, discharge fitting (2), inlet flange (2) (76040-36AX22).	ea	--	4	K	K	K	K	K	K	--	--	B-55	17
P	F		5310-974-7478	WASHER: 3/8 lock, block to crankcase (76040-36AX3).	ea	--	6	*	*	*	*	*	*	--	--	B-55	4
X1	F		....	HEAD: air compressor cyl complete (76040-745-275336).	ea	--	1	K	K	K	K	K	K	--	--	B-56	4
				Consists of:													
X1	F		....	1 CYLINDER HEAD: (76040-745-240481).	--	--	--	K	K	K	K	K	K	--	--	B-56	6
X1	F		....	2 DISCHARGE VALVE SEAT: (76040-745-236219).	--	--	--	K	K	K	K	K	K	--	--	B-56	5
X1	F		....	NUT: cap, discharge valve (76040-745-210469).	ea	--	2	K	K	K	K	K	K	--	--	B-56	1
X1	F		....	PLUG: 3/8 socket head cyl head (76040-745-233057).	ea	--	2	K	K	K	K	K	K	--	--	B-56	7

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				1209—AIR COMPRESSOR ASSEMBLY—Continued													
X1	F		------------	SPRING: discharge valve (**Repair Kit 76040-745-229416) (76040-745-210468).	ea	--	2	K	K	K	K	K	K	--	--	B-56	2
X1	F		------------	VALVE: discharge (**Repair Kit 76040-745-229416) (76040-745-203102).	ea	--	2	K	K	K	K	K	K	--	--	B-56	3
X1	F		------------	BEARING: connecting rod insert (76040-745-238610).	ea	--	2	K	K	K	K	K	K	--	--	B-57	19
X1	F		------------	BLOCK: assy, air compressor (76040-745-277370).	ea	--	1	K	K	K	K	K	K	--	--	B-57	4
				Consists of:													
X1	F		------------	2 BUSHING: unloader piston (76040-745-238586).	--	--	--	K	K	K	K	K	K	--	--	B-57	12
X1	F		------------	2 SEAT: inlet valve (76040-745-236118)	--	--	--	K	K	K	K	K	K	--	--	B-57	5
X1	F		------------	GUIDE: inlet valve (**REPAIR KIT 76040-745-229416) (76040-745-239395).	ea	--	2	K	K	K	K	K	K	--	--	B-57	2
X1	F		------------	GUIDE: unloader plunger (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-745-240022).	ea	--	2	K	K	K	K	K	K	--	--	B-57	6
X1	F		------------	PISTON: assy, unloader (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-745-229875).	ea	--	2	K	K	K	K	K	K	--	--	B-57	11
				Consists of:													
X1	F		------------	1 GROMMET: rubber (76040-745-238143).	--	--	--	K	K	K	K	K	K	--	--	B-57	10
X1	F		------------	1 PISTON: unloader (76040-745-240018)	--	--	--	K	K	K	K	K	K	--	--	B-57	8
X1	F		------------	1 RING: backup (76040-745-238144)	--	--	--	K	K	K	K	K	K	--	--	B-57	9
X1	F		------------	PISTON AND PIN ASSEMBLY: (76040-745-276942).	ea	--	2	K	K	K	K	K	K	--	--	B-57	13
				Consists of:													
X1	F		------------	1 PIN: (76040-745-241730)	--	--	--	K	K	K	K	K	K	--	--	B-57	23
X1	F		------------	1 PISTON: (76040-745-241722)	--	--	--	K	K	K	K	K	K	--	--	B-57	24
X1	F		------------	PIN: wristpin lock (76040-745-238548)	ea	--	2	K	K	K	K	K	K	--	--	B-57	25
X1	F		------------	PLUNGER: unloader (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-745-240023).	ea	--	2	K	K	K	K	K	K	--	--	B-57	7
X1	F		------------	RING SET: piston, std (8 rings) (76040-745-276938).	ea	--	1	K	K	K	K	K	K	--	--	B-57	14

X1	F		....	ROD AND CAP: complete, connecting (76040-745-228199).	ea	--	2	K	K	K	K	K	K	--	--	B-57	16
				Consists of:													
X1	F		....	2 BOLT: connecting rod (76040-745-238598).	--	--	--	K	K	K	K	K	K	--	--	B-57	17
X1	F		....	1 BUSHING: wristpin (76040-745-239541).	--	--	--	K	K	K	K	K	K	--	--	B-57	15
X1	F		....	2 LOCKWASHER: rod bolt (76040-745-238597).	--	--	--	K	K	K	K	K	K	--	--	B-57	18
X1	F		....	SADDLE: unloader spring (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-745-240025).	ea	--	1	K	K	K	K	K	K	--	--	B-57	20
X1	F		....	SEAT: unloader spring (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-745-238491).	ea	--	1	K	K	K	K	K	K	--	--	B-57	22
X1	F		....	SPRING: inlet valve (**REPAIR KIT 76040-745-229416) (76040-745-236126).	ea	--	2	K	K	K	K	K	K	--	--	B-57	1
X1	F		....	SPRING: unloader (**REPAIR KIT 76040-745-229416 and UNLOADER KIT 76040-745-279614) (76040-745-239972).	ea	--	1	K	K	K	K	K	K	--	--	B-57	21
X1	F		....	VALVE: inlet (**REPAIR KIT 76040-745-229416) (76040-745-236125).	ea	--	2	K	K	K	K	K	K	--	--	B-57	3
X1	F		....	BEARING: crankshaft, front (1) rear (1) (76040-745-236120).	ea	--	2	K	K	K	K	K	K	--	--	B-58	2
X1	F		....	CRANKCASE: air compressor (76040-745-241495).	ea	--	1	K	K	K	K	K	K	--	--	B-58	4
X1	F		....	CRANKSHAFT: air compressor (76040-745-241494).	ea	--	1	K	K	K	K	K	K	--	--	B-58	3
P	F		2530-974-7598	GEAR: hyd pump driving (76050-681GB13)	ea	--	1	*	2	2	*	2	2	6	10	B-58	1
X1	F		....	KEY: hyd pump drive gear (76040-745-232013).	ea	--	1	K	K	K	K	K	K	--	--	B-58	7
X1	F		....	RETAINER: front brg (76040-745-231266).	ea	--	1	K	K	K	K	K	K	--	--	B-58	5
X1	F		....	SCREW: brg retainer (76040-745-203563) ..	ea	--	3	K	K	K	K	K	K	--	--	B-58	6
				GROUP 14—STEERING													
				1410—HYDRAULIC PUMP OR FLUID MOTOR ASSEMBLY: MODEL VTM 27-60-45-10-MO-L1-10-S8.													
X1	F		....	BEARING: front (76040-8813-214118)	ea	--	1	K	K	K	K	K	K	--	--	B-59	21
X1	F		....	BEARING: rear (76040-8813-222440)	ea	--	1	K	K	K	K	K	K	--	--	B-59	17
X1	F		....	BODY: pump (76040-8813-936883)	ea	--	1	K	K	K	K	K	K	--	--	B-59	16
X1	F		....	COVER: pump (76040-8813-217987	ea	--	1	K	K	K	K	K	K	--	--	B-59	6
P	F		2530-974-7599	GEAR: driven (76040-681GB14)	ea	--	1	*	2	2	*	2	2	8	10	B-59	23
P	F		5315-023-2585	KEY: gear to shaft (76040-8813-1606)	ea	--	1	*	2	2	*	2	2	6	10	B-59	20

(1) Source, Main. and Recov. Code			(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.						(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100			(a) Fig. No.	(b) Item or Sym. No.
				1410—HYDRAULIC PUMP OR FLUID MOTOR ASSEMBLY—Continued													
P	F		2530–890–2366	KIT, CARTRIDGE: vane and rotor (76040–8813–922639).	ea	--	1	*	2	2	*	2	2	10	20	B–59	10
				Composed of:													
X1	F		--------------	1 RING: (76040–8813–213935) ----------	--	--	--	K	K	K	K	K	K	--	--	B–59	11
X1	F		--------------	1 ROTOR: (76040–8813–213859) ----------	--	--	--	K	K	K	K	K	K	--	--	B–59	12
X1	F		--------------	1 VANE KIT: (10 vanes) (76040–8813–922594).	--	--	--	K	K	K	K	K	K	--	--	B–59	13
X1	F		--------------	MANIFOLD: inlet and bypass ports (76040–8813–256849).	ea	--	1	K	K	K	K	K	K	--	--	B–59	3
P	F		5310–023–2745	NUT: 1/2-20 NF lock gear retaining (76040–21AX638).	ea	--	1	*	2	2	*	2	2	6	10	B–59	25
X1	F		--------------	PIN: ring locating (76040–8813–154364) -----	ea	--	2	K	K	K	K	K	K	--	--	B–59	9
X1	F		--------------	PIN: control valve retaining (76040–8813–32559).	ea	--	1	K	K	K	K	K	K	--	--	B–59	31
X1	F		--------------	PLATE: pressure (76040–8813–213988) -----	ea	--	1	K	K	K	K	K	K	--	--	B–59	8
X1	F		--------------	PLUG: control valve (76040–8813–175049) -	ea	--	1	K	K	K	K	K	K	--	--	B–59	26
P	F		2530–974–7495	PUMP, HYDRAULIC: assy power steering (opt with PUMP 76040–33QC417A) (76040–33QC417).	ea	--	1	2	2	3	2	2	3	10	10	B–59	32
X1	F		--------------	SCREW: cover to body (76040–8813–1278) --	ea	--	4	K	K	K	K	K	K	--	--	B–59	30
X1	F		--------------	SCREW: manifold to cover (76040–8813–1028).	ea	--	3	K	K	K	K	K	K	--	--	B–59	1
P	F		2530–890–2365	SEAL KIT: pump overhaul (76040–8813–922630).	ea	--	1	2	2	2	2	2	2	14	100	B–59	--
				Composed of:													
X1	F		--------------	1 PACKING, PREFORMED: control valve (76050–8813–213997).	--	--	--	K	K	K	K	K	K	--	--	B–59	27
X1	F		--------------	1 PACKING, PREFORMED: Manifold to cover (76040–8813–213999).	--	--	--	K	K	K	K	K	K	--	--	B–59	4
X1	F		--------------	1 SEAL, SHAFT: (76040–8813–213996 ---	--	--	--	K	K	K	K	K	K	--	--	B–59	22
X1	F		--------------	2 PACKING, PREFORMED: manifold to cover (76040–8813–154005).	--	--	--	K	K	K	K	K	K	--	--	B–59	5
X1	F		--------------	1 PACKING, PREFORMED: cover to body (76040–8813–213998).	--	--	--	K	K	K	K	K	K	--	--	B–59	14

X1	F		....	1 PACKING, PREFORMED: cover to body (76040-8813-184177).	--	--	--	K	K	K	K	K	K	--	--	B-59	15
X1	F		....	SHAFT: power steering pump (76040-8813-213992).	ea	--	1	K	K	K	K	K	K	--	--	B-59	18
X1	F		....	SPACER: steering pump shaft (76040-8813-124000).	ea	--	2	K	K	K	K	K	K	--	--	B-59	19
X1	F		....	SPRING: control valve (76040-8813-170072).	ea	--	1	K	K	K	K	K	K	--	--	B-59	29
X1	F		....	SPRING: plate tension (76040-8813-245507).	ea	--	1	K	K	K	K	K	K	--	--	B-59	7
X1	F		....	VALVE: control (76040-8813-232795)	ea	--	1	K	K	K	K	K	K	--	--	B-59	28
P	F		5310-734-3398	WASHER: flat driven gear nut (76040-37AX26).	ea	--	1	*	2	2	*	2	2	6	10	B-59	24
P	F		5310-023-4289	WASHER: manifold screw, copper (76040-8813-28931).	ea	--	1	2	2	3	2	2	3	6	10	B-59	2
				1410—HYDRAULIC PUMP OR FLUID MOTOR ASSEMBLY: MODEL VTM 27-60-45-10-MO-L1-12-S8													
X1	F		....	BEARING: front (76040-8813-148423)	ea	--	1	K	K	K	K	K	K	--	--	B-60	18
X1	F		....	BODY: pump (76040-8813-280941)	ea	--	1	K	K	K	K	K	K	--	--	B-60	15
X1	F		....	COVER: pump (76040-8813-280420)	ea	--	1	K	K	K	K	K	K	--	--	B-60	5
P	F		2530-974-7599	GEAR: driven (76040-681GB14)	ea	--	1	*	*	*	*	*	*	--	--	B-60	24
P	F		5315-023-2585	KEY: gear to shaft (76040-8813-1606)	ea	--	1	*	*	*	*	*	*	--	--	B-60	20
P	F		2530-890-2368	KIT, CARTRIDGE: vane and rotor (76040-8813-923292).	ea	--	1	*	2	2	*	2	2	10	20	B-60	9
				Composed of:													
X1	F		....	1 RING: (76040-8813-296599)	--	--	--	--	K	K	K	K	K	--	--	B-60	10
X1	F		....	1 ROTOR: (76040-8813-213859)	--	--	--	--	K	K	K	K	K	--	--	B-60	11
X1	F		....	1 VANE KIT: (10 vanes) (76040-8813-922594).	--	--	--	--	K	K	K	K	K	--	--	B-60	12
X1	F		....	MANIFOLD: inlet end bypass ports (76040-8813-256849).	ea	--	1	K	K	K	K	K	K	--	--	B-60	3
P	F		5310-023-2745	NUT: 1/2-20 NF lock, gear retaining (76040-21AX638).	ea	--	1	*	*	*	*	*	*	--	--	B-60	22
X1	F		....	PIN: ring locating (76040-8813-154364) ...	ea	--	2	K	K	K	K	K	K	--	--	B-60	8
X1	F		....	PIN: control valve retaining (76040-8813-32559).	ea	--	1	K	K	K	K	K	K	--	--	B-60	30
X1	F		....	PLATE: pressure (76040-8813-276396)	ea	--	1	K	K	K	K	K	K	--	--	B-60	7
X1	F		....	PLUG: control valve (76040-8813-175049) ..	ea	--	1	K	K	K	K	K	K	--	--	B-60	25
P	F		....	PUMP, HYDRAULIC: assy, power steering (76040-38QC417A).	ea	--	1	3	2	3	2	2	3	6	12	B-60	31
X1	F		....	RING: snap, shaft front (76040-8813-172376).	ea	--	1	K	K	K	K	K	K	--	--	B-60	21
X1	F		....	RING: snap, shaft rear (76040-8813-106641).	ea	--	4	K	K	K	K	K	K	--	--	B-60	17

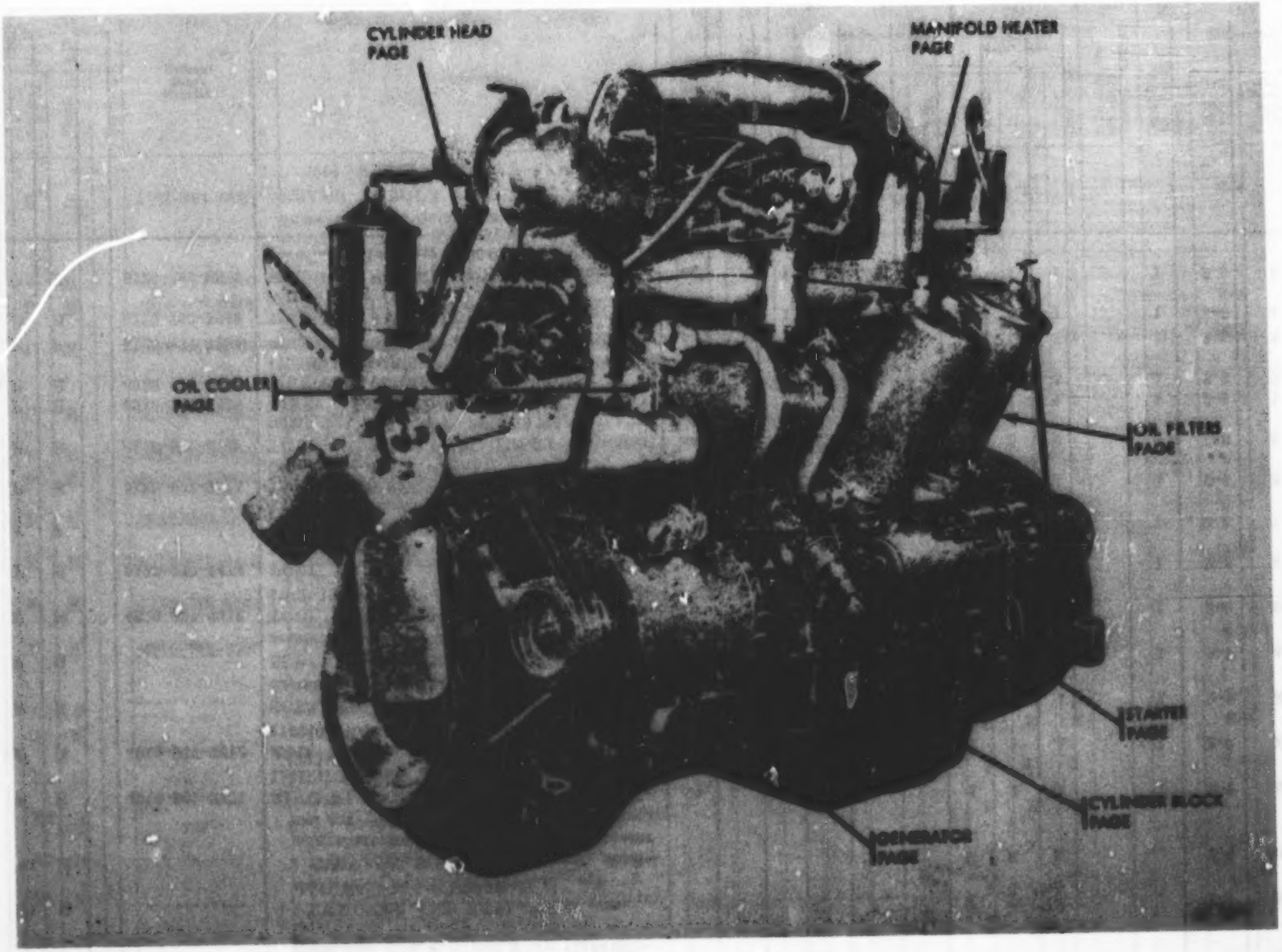
(1) Source, Maint. and Recov. Code (a) Source	(1) (b) Maint.	(1) (c) Recov.	(2) Federal Stock Number	(3) Description	(4) Unit of Issue	(5) Qty Inc in Unit Pack	(6) Qty Inc in Unit	(7) 30-Days DS Maint. Alw. (a) 1–20	(7) (b) 21–50	(7) (c) 51–100	(8) 30-Days GS Maint. Alw. (a) 1–20	(8) (b) 21–50	(8) (c) 51–100	(9) 1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	(10) Depot Maint. Alw. Per 100 Equip.	(11) Illustration (a) Fig. No.	(11) (b) Item or Sym. No.
				0410—HYDRAULIC PUMP OR FLUID—Continued													
X1	F		....	SCREW: cover to body (76040-8813-171523)	ea	--	4	K	K	K	K	K	K	--	--	B–60	29
X1	F		....	SCREW: manifold to cover (76040-8813-1029).	ea	--	3	K	K	K	K	K	K	--	--	B–60	1
P	F		2530-890-2367	SEAL KIT: pump overhaul (76040-8813-922904).	ea	--	1	2	2	2	2	2	2	14	100	B–60	--
				Composed of:													
X1	F		....	1 GASKET: manifold to cover (76040-8813-291667).	--	--	--	K	K	K	K	K	K	--	--	B–60	4
X1	F		....	1 PACKING, PREFORMED: control valve (76040-8813-199390).	--	--	--	K	K	K	K	K	K	--	--	B–60	26
X1	F		....	1 PACKING, PREFORMED: cover to body (76040-8813-213998).	--	--	--	K	K	K	K	K	K	--	--	B–60	13
X1	F		....	1 PACKING, PREFORMED: cover to body (76040-8813-184177).	--	--	--	K	K	K	K	K	K	--	--	B–60	14
X1	F		....	1–SEAL: shaft (76040-8813-263585)	--	--	--	K	K	K	K	K	K	--	--	B–60	16
X1	F		....	SHAFT: power steering pump (76040-8813-276376).	ea	--	1	K	K	K	K	K	K	--	--	B–60	19
X1	F		....	SPRING: control valve (76040-8813-170072).	ea	--	1	K	K	K	K	K	K	--	--	B–60	28
X1	F		....	SPRING: plate tension (76040-8813-245507).	ea	--	1	K	K	K	K	K	K	--	--	B–60	6
X1	F		....	VALVE: pressure control (76040-8813-232795).	ea	--	1	K	K	K	K	K	K	--	--	B–60	27
P	F		5310-734-3398	WASHER: flat driven gear nut (76040-37AX26).	ea	--	1	*	*	*	*	*	*	--	--	B–60	23
P	F		5310-023-4289	WASHER: manifold screw, copper (76040-8813-28931).	ea	--	1	*	*	*	*	*	*	--	--	B–60	2

SPECIAL TOOLS, TEST AND SUPPORT EQUIPMENT FOR DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT MAINTENANCE

			GROUP 26—TOOLS AND TEST EQUIPMENT **2604—SPECIAL TOOLS**													
P	H	4910-977-7417	**ADAPTER**: connecting rod capscrew wrench (76040-17-T-1560).	ea	--	1	--	--	--	1	1	1	--	1	2-1	1
P	H	4910-977-7402	**ADAPTER**: cyl compression tester (76040-17-T-11176).	ea	--	1	--	--	--	1	1	1	--	1	2-1	2
P	H	4910-996-7257	**ADAPTER**: overhaul stand, front (10938061).	ea	--	2	--	--	--	1	1	1	--	1	2-1	3
P	H	4910-996-7256	**ADAPTER**: overhaul stand, rear (10938060).	ea	--	1	--	--	--	1	1	1	--	1	2-2	1
P	H	4910-977-7405	**BRUSH**: carbon removing (76040-17-T-112).	ea	--	1	--	--	--	1	1	1	--	1	2-3	1
P	H	4910-977-7403	**CAP**: fuel inlet protection (6 injection pump—6 nozzles) (76040-17-T-1549A)	ea	--	12	--	--	--	12	12	12	--	12	2-3	2
P	H	4910-961-2770	**COUPLING DRIVE**: injection pump (76040-17-T-11412).	ea	--	1	--	--	--	1	1	1	--	1	2-3	3
P	H	5120-977-7404	**EXTRACTOR**: fuel injection pump, delivery valve (76040-17-T-11105).	ea	--	1	--	--	--	1	1	1	--	1	2-3	4
P	H	4910-977-8967	**GAGE**: water pump rotor setting (76040-17-T-11310).	ea	--	1	--	--	--	1	1	1	--	1	2-3	5
P	H	....	**INSTALLER**: driver nozzle sleeve (76040-17-T-11395).	ea	--	1	1	1	1	1	1	1	--	1	2-3	6
P	F	....	**INSTALLER**: water pump brgs and seal (11644677).	ea	--	1	1	1	1	1	1	1	--	1	2-3	7
P	F	....	**INSTALLER KIT**: crankshaft rear seal (11644694).	ea	--	1	1	1	1	1	1	1	--	1	2-3	8
			Composed of:													
X1	F	....	**GUIDE**: crankshaft rear seal (11644681)	--	--	--	K	K	K	K	K	K	--	--	2-3	9
X1	F	....	**INSTALLER**: crankshaft rear seal (11644684).	--	--	--	K	K	K	K	K	K	--	--	2-3	10

(1) Source, Main. and Recov. Code			(2)	(3)	(4)	(5)	(6)	(7) 30-Days DS Maint. Alw.			(8) 30-Days GS Maint. Alw.			(9)	(10)	(11) Illustration	
(a) Source	(b) Maint.	(c) Recov.	Federal Stock Number	Description	Unit of Issue	Qty Inc in Unit Pack	Qty Inc in Unit	(a) 1–20	(b) 21–50	(c) 51–100	(a) 1–20	(b) 21–50	(c) 51–100	1-Yr. Alw. Per 100 Equip. Cntgcy. Planning	Depot Maint. Alw. Per 100 Equip.	(a) Fig. No.	(b) Item or Sym. No.
				2604—SPECIAL TOOLS—Continued													
P	H		5120–321–6582	LEVER, TORQUE ADAPTER: injection pump governor drive slip clutch (used w/SCALE FSN 6670–526–8706) (76040–79–TSE7947).	ea	--	1	--	--	--	1	1	1	--	1	2–4	1
P	H		5120–977–7406	LIFTER: tappet (76040–17–T–1966)	ea	--	1	--	--	--	1	1	1	--	1	2–4	2
P	H		4910–977–7407	NEEDLES, ORIFICE CLEANING: injection nozzle (set of 5) (76040–17–T–11099).	ea	--	5	--	--	--	1	1	1	--	1	2–4	3
P	H		4730–481–2767	PLUG, MACHINE THREAD: injection pump, fuel line protection (12 required) (76040–49AX61).	ea	--	12	--	--	--	12	12	12	12	12	2–4	4
P	H		5120–977–7409	PULLER: governor drive gear (76040–17–T–11223).	ea	--	1	--	--	--	1	1	1	--	1	2–4	6
P	H		4910–977–7408	PIN: tappet, retaining (76040–17–T–1970)	ea	--	1	--	--	--	1	1	1	--	1	--	--
P	H		5120–422–8967	PULLER, PLUNGER: injection pump (76040–79–TSE7661).	ea	--	1	--	--	--	1	1	1	--	1	2–5	7
P	H		5110–977–7411	REAMER: carbon removing, nozzle (76040–17–T–11103).	ea	--	1	--	--	--	1	1	1	--	1	2–5	8
P	H		5110–977–7410	REAMER: governor operating lever (76040–17–T–11242).	ea	--	1	--	--	--	1	1	1	--	1	2–5	9
P	H		5110–255–6541	REAMER: valve guide .5000 ±.0005-in. dia (76040–17–T–1793).	--	--	--	--	--	--	1	1	1	--	1	2–5	10
P	H		4910–756–2720	REMOVER AND REPLACER KIT: camshaft and auxiliary shaft brg (11644695).	--	--	--	--	--	--	1	1	1	--	1	2–6	11
				Composed of:													
X1	H		....	1 DRIVE BAR: 19 in. long (11644680)	--	--	--	--	--	--	K	K	K	--	--	2–6	1
X1	H		....	1 DRIVE BAR EXTENSION: 24 in. long (11644679).	--	--	--	--	--	--	K	K	K	--	--	2–6	2
X1	H		....	1 DRIVER: camshaft and auxiliary shaft brg remover and replacer (11644674).	--	--	--	--	--	--	K	K	K	--	--	2–6	3
X1	H		....	1 GUIDE PLUG: camshaft brg remover and replacer (11644678).	--	--	--	--	--	--	K	K	K	--	--	--	--
X1	H		....	1 REMOVER AND REPLACER: auxiliary shaft front brg (11644675–3).	--	--	--	--	--	--	K	K	K	--	--	2–6	4
X1	H		....	1 REMOVER AND REPLACER: auxiliary shaft rear brg (11644675–2).	--	--	--	--	--	--	K	K	K	--	--	2–6	9
X1	H		....	1 REMOVER AND REPLACER: camshaft No. 1 brg (11644675–1).	--	--	--	--	--	--	K	K	K	--	--	2–6	8

X1	H		------------	1 REMOVER AND REPLACER: camshaft Nos. 2, 3, 4, 5, and 6 brg (11644676-1).	--	--	--	--	--	--	K	K	K	--	--	2-6	5
X1	H		------------	1 REMOVER AND REPLACER: camshaft No. 7 brg (116446N-2).	--	--	--	--	--	--	K	K	K	--	--	2-6	6
X1	H		------------	1 STORAGE BOX: camshaft and auxiliary shaft bushing remover and replacer tool set (11644693).	--	--	--	--	--	--	K	K	K	--	--	2-6	10
P	H		4910-981-2771	RING FLANGE ADAPTER: (76040-17-T-11411).	ea	--	1	--	--	--	1	1	1	--	1	2-7	1
P	H		4910-977-7412	ROD, DRIVE: control rack outer bushing (76040-17-T-1979).	ea	--	1	--	--	--	1	1	1	--	1	2-7	2
P	H		------------	SCRAPER: injector nozzle body pressure chamber (76040-17-T-1896).	ea	--	1	1	1	1	1	1	1	--	1	2-7	3
P	H		------------	SLEEVE, CENTERING: injector nozzle reassembling (76040-17-T-11104).	ea	--	1	--	--	--	1	1	1	--	1	2-7	4
P	H		4910-977-7419	TOOL: plunger spring compression (76040-17-T-1976).	ea	--	1	--	--	--	1	1	1	--	1	2-8	3
P	H		5120-977-7418	TOOL, VALVE: seat reconditioning (76040-17-T-1933).	ea	--	1	--	--	--	1	1	1	--	1	2-8	4
P	F		------------	TOOL ALINEMENT: timing gear cover 4 in. brg crankshaft (76040-17-T-11097).	ea	--	1	1	1	1	1	1	1	--	1	2-8	1
P	H		5120-862-9371	TOOL COMPRESSING: injection pump tappet (76040-17-T-1975).	ea	--	1	--	--	--	1	1	1	--	1	2-8	2
P	H		4910-981-2768	TUBE, NOZZLE FUEL INLET: injection pump test fuel (76040-203GCA170).	ea	--	6	--	--	--	6	6	6	--	6	2-8	5
P	H		4910-977-7416	VISE: needle (76040-17-T-11100).	ea	--	1	--	--	--	1	1	1	--	1	2-9	1
P	H		4910-977-8971	WRENCH: control rack outer bushing (76040-17-T-1973).	ea	--	1	--	--	--	1	1	1	--	1	2-9	2
P	F		5120-937-7834	WRENCH: cyl head nut (10951484)	ea	--	1	--	--	--	1	1	1	--	1	2-9	3
P	H		5120-793-5045	WRENCH, PRONGED: injection pump bottom plug (10882851).	ea	--	1	--	--	--	1	1	1	--	1	2-9	4
P	H		5120-821-6517	WRENCH, PRONGED: injection pump governor drive gear (76040-79-TSE7920).	ea	--	1	--	--	--	1	1	1	--	1	2-9	5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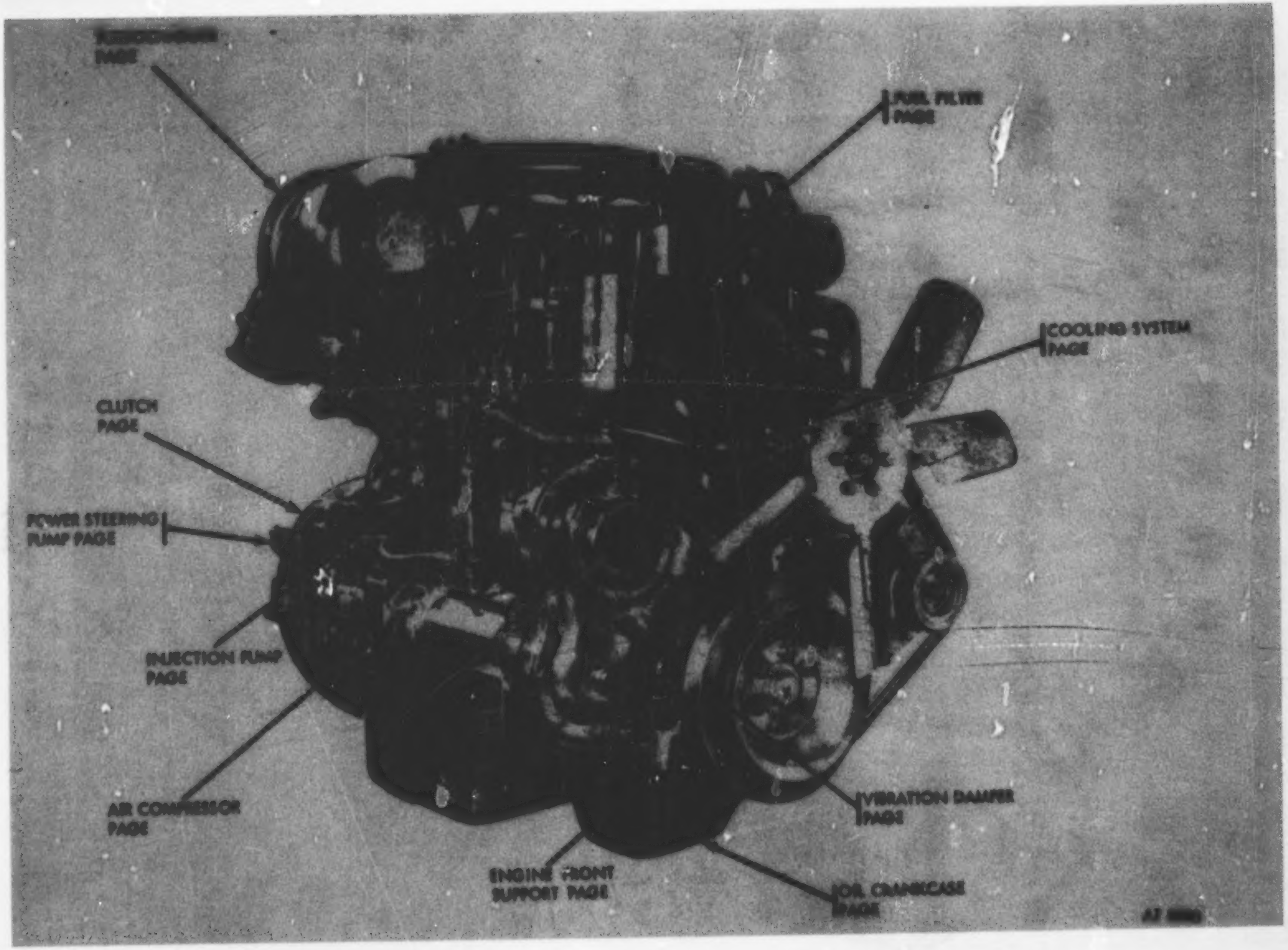
OIL FILTERS PAGE
STARTER PAGE
CYLINDER BLOCK PAGE
GENERATOR PAGE

Figure B–1. Visual guide to contents—left front view.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SUPPORT PAGE
VIBRATION DAMPER
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Figure B-2. Visual guide to contents—right front view.

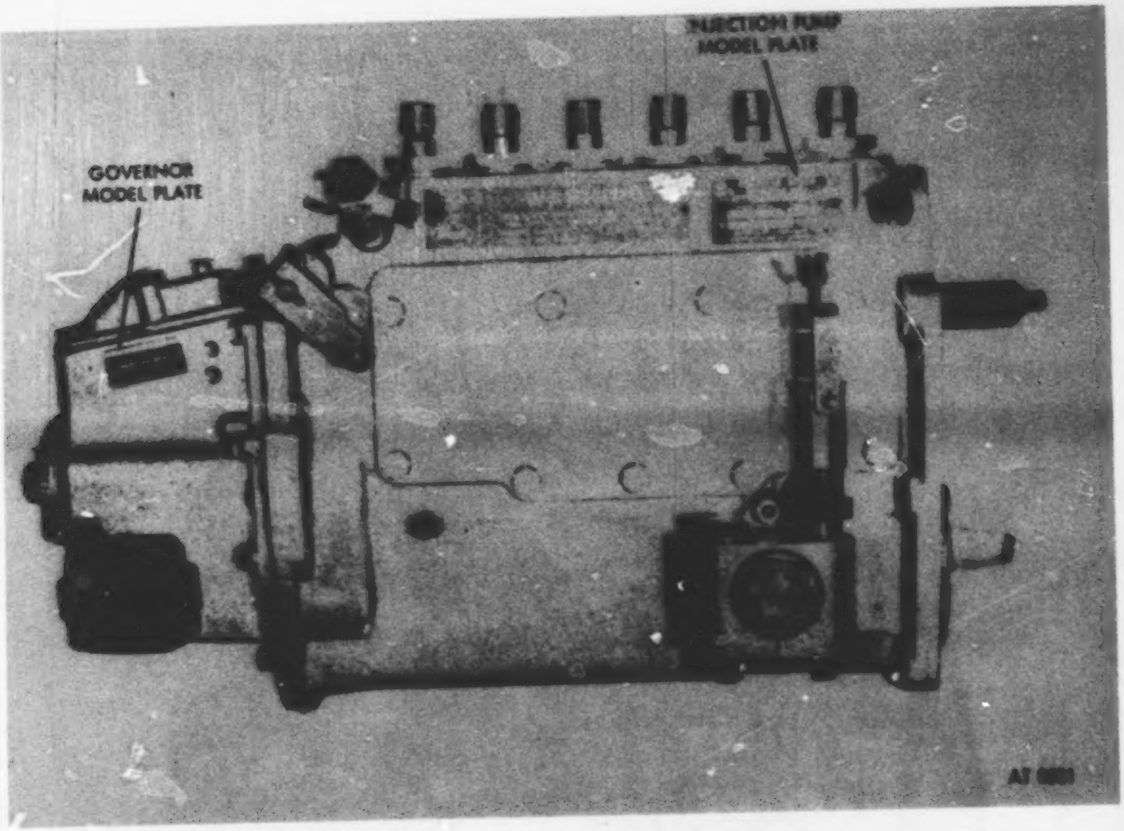

INJECTION PUMP MODEL PLATE
GOVERNOR MODEL PLATE

Figure B-3. Model identification plates—injection pump.

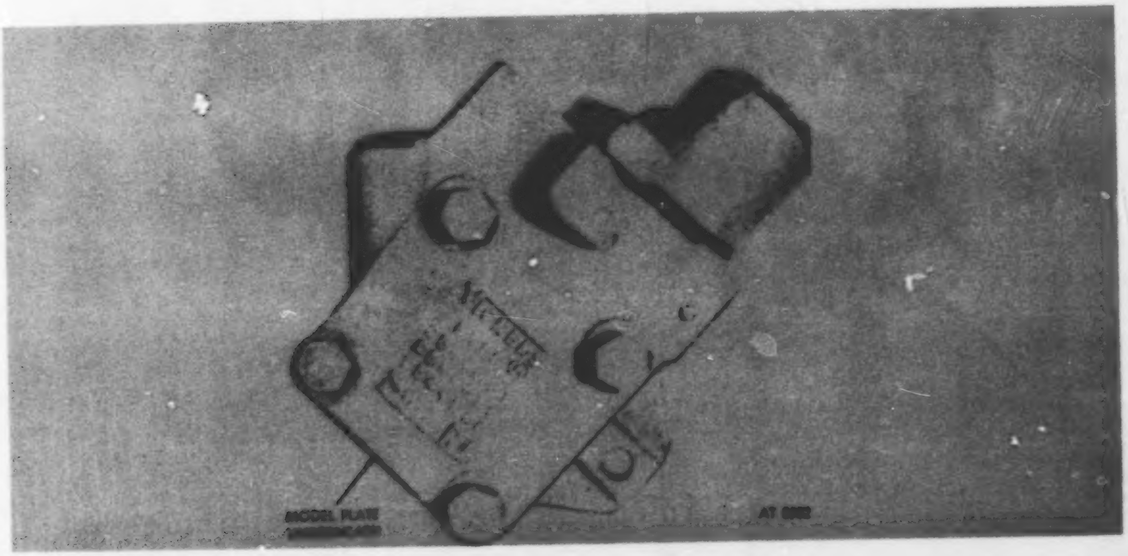

MODEL PLATE

Figure B-4. Model identification plate—hydraulic pump.

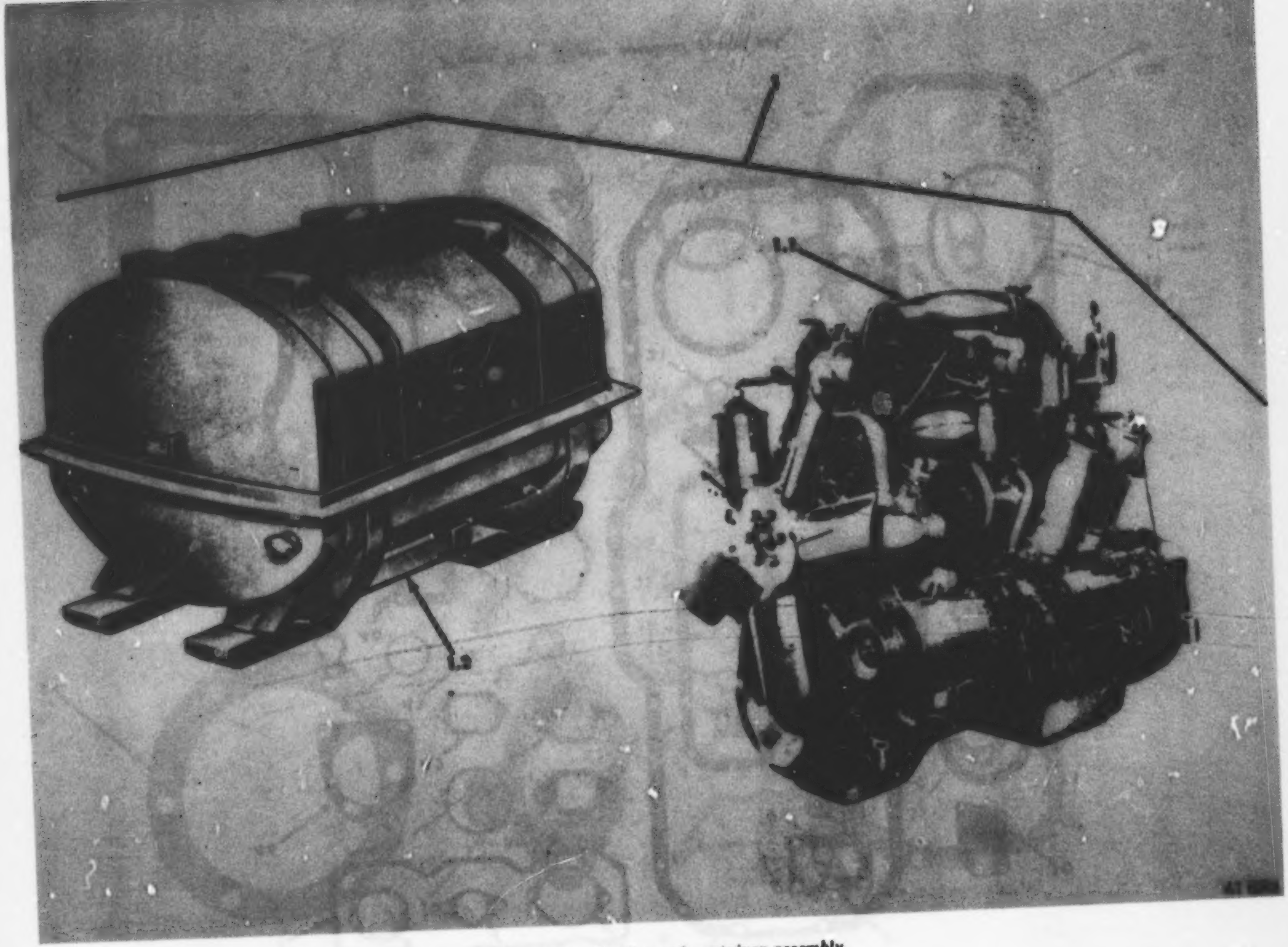
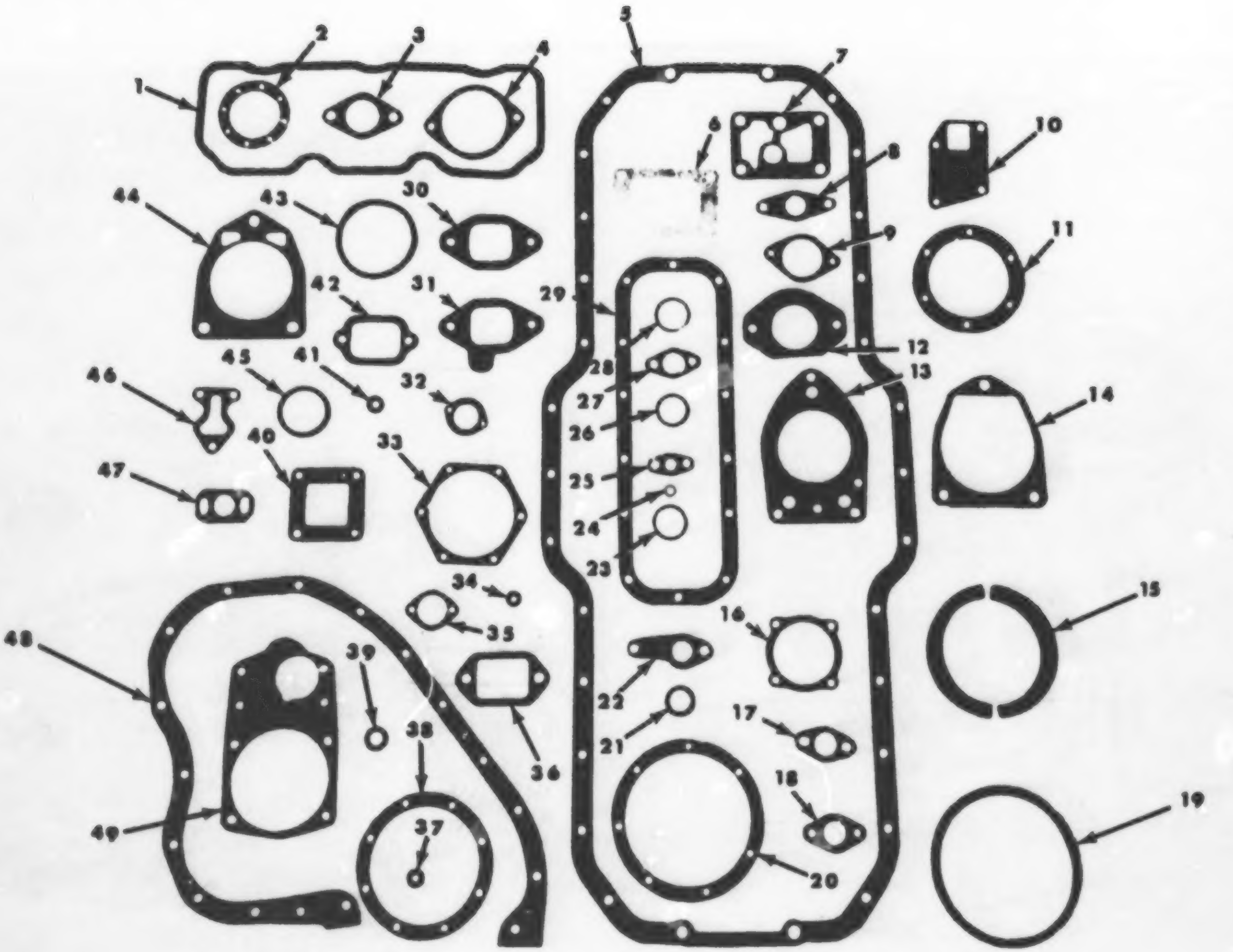


Figure B-5. Engine and container assembly.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AT 8584

Figure B-6. Engine overhaul gasket set.

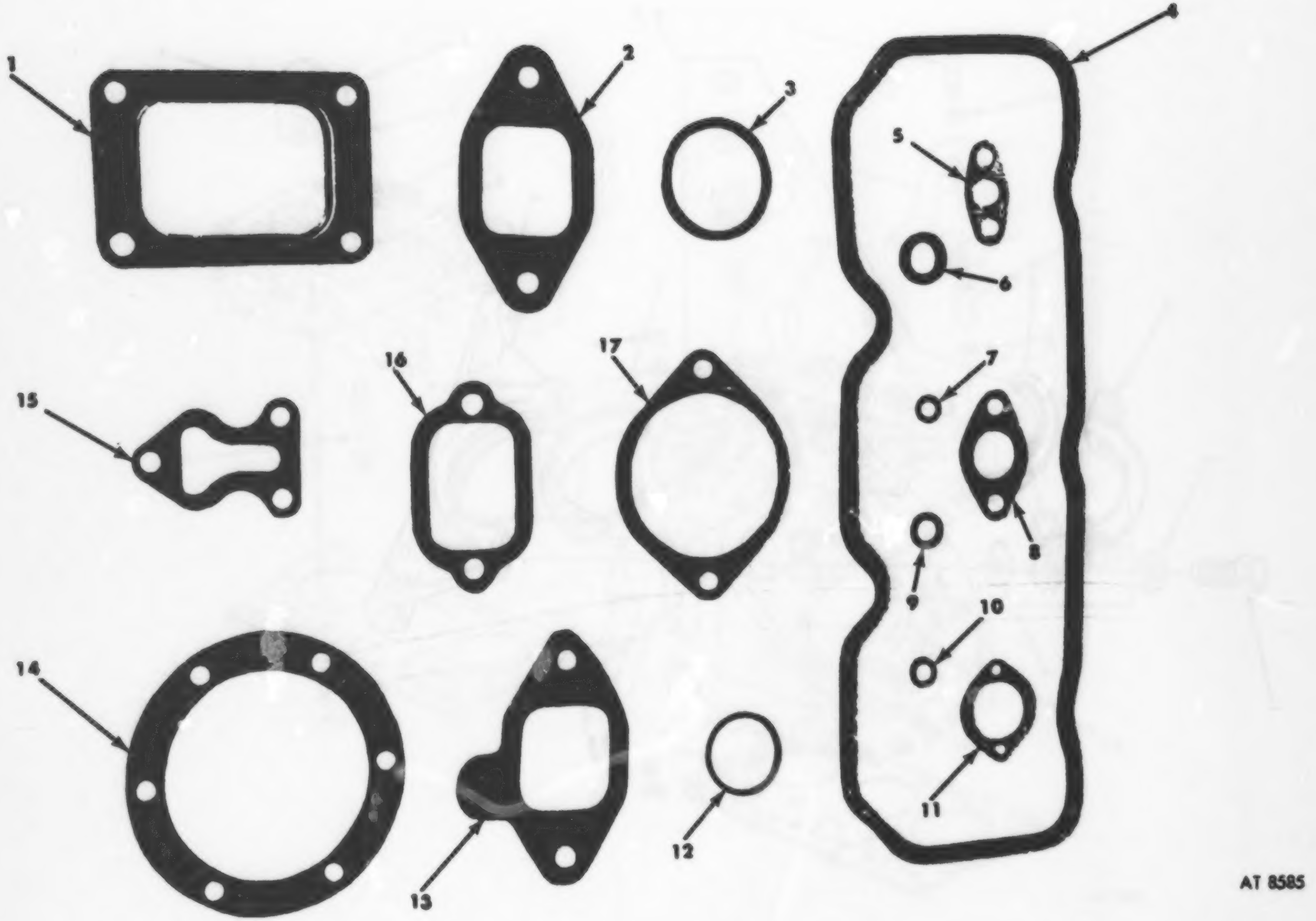
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Figure B–7. Engine valve grind gasket set.

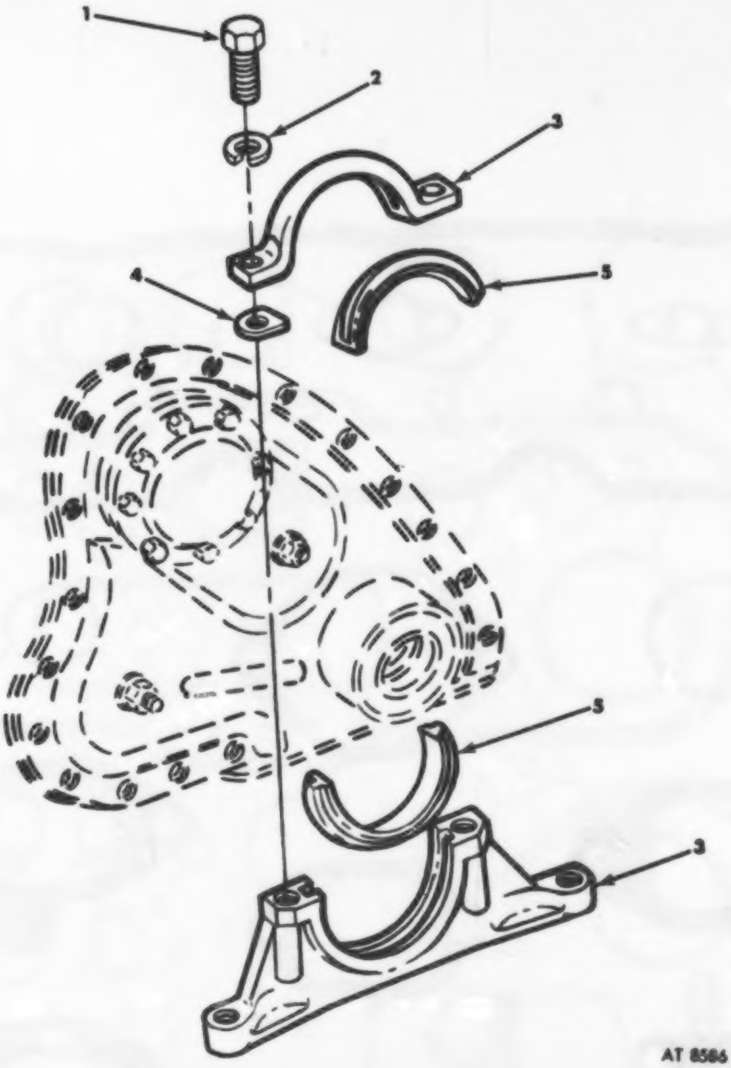
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Figure B–8. Front engine support—exploded view.

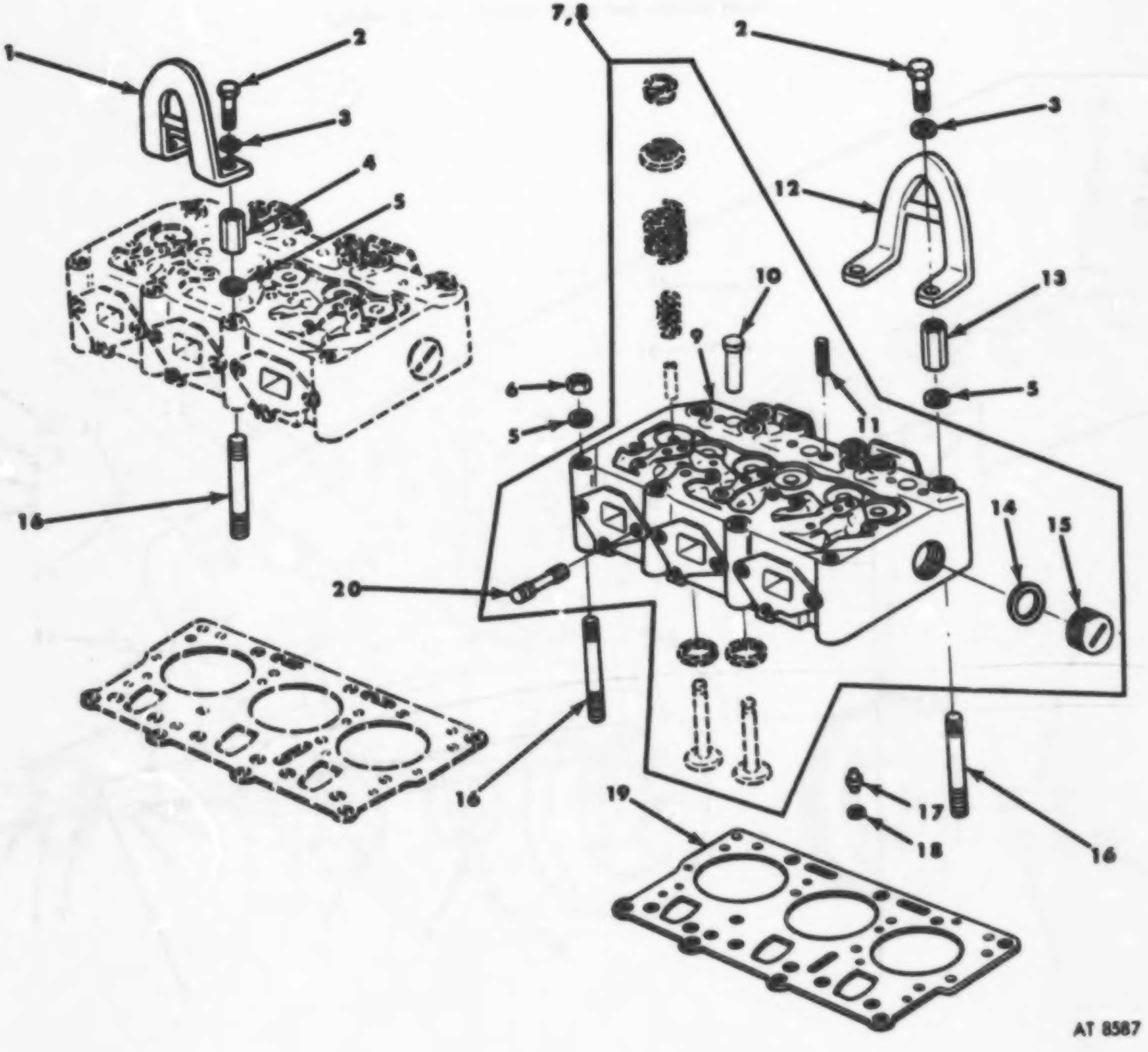
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Figure B–9. Cylinder head and related parts.

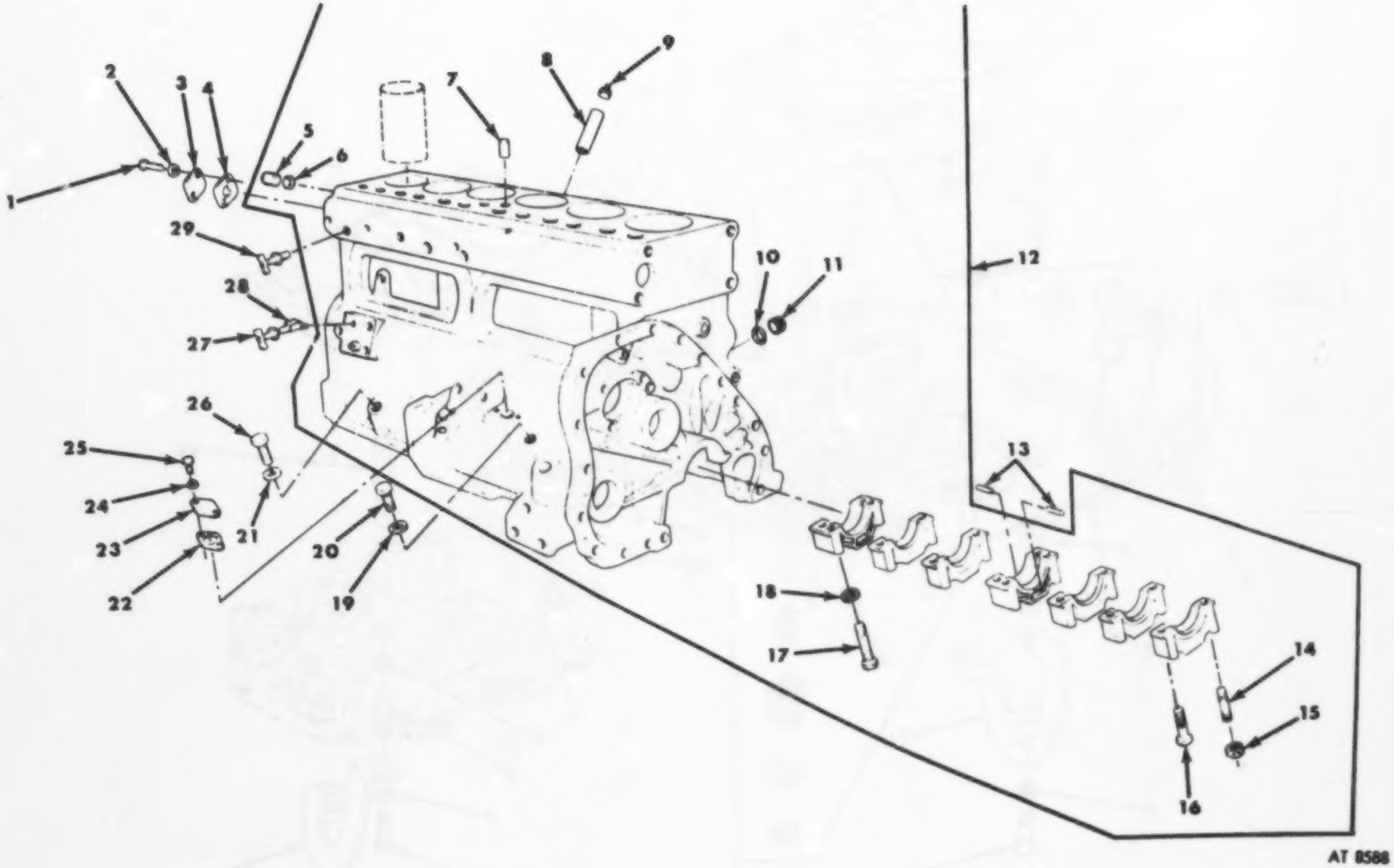
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Figure B–10. Cylinder block and related parts.

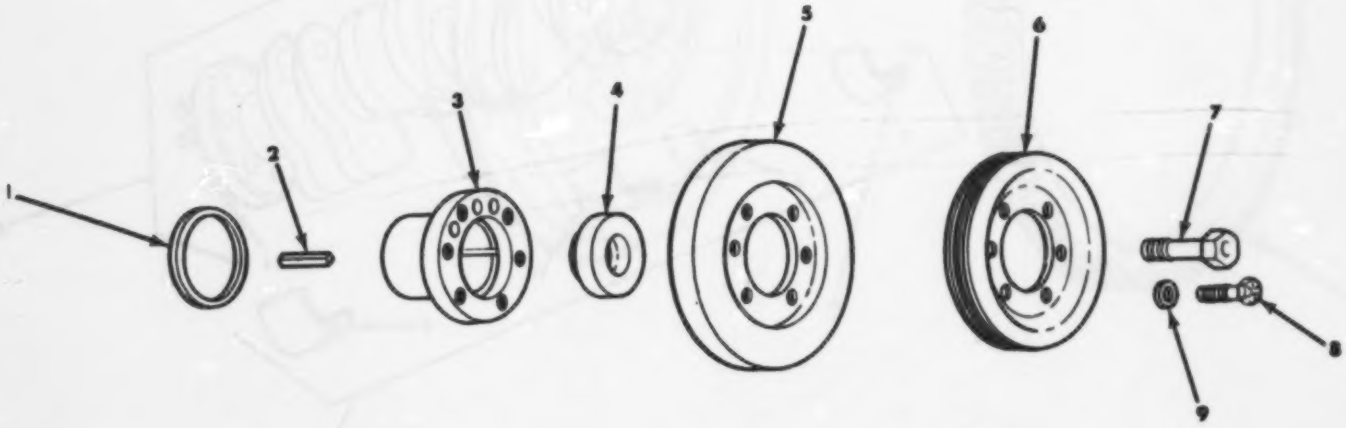
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Figure B–11. Vibration damper hub and pulley—exploded view.

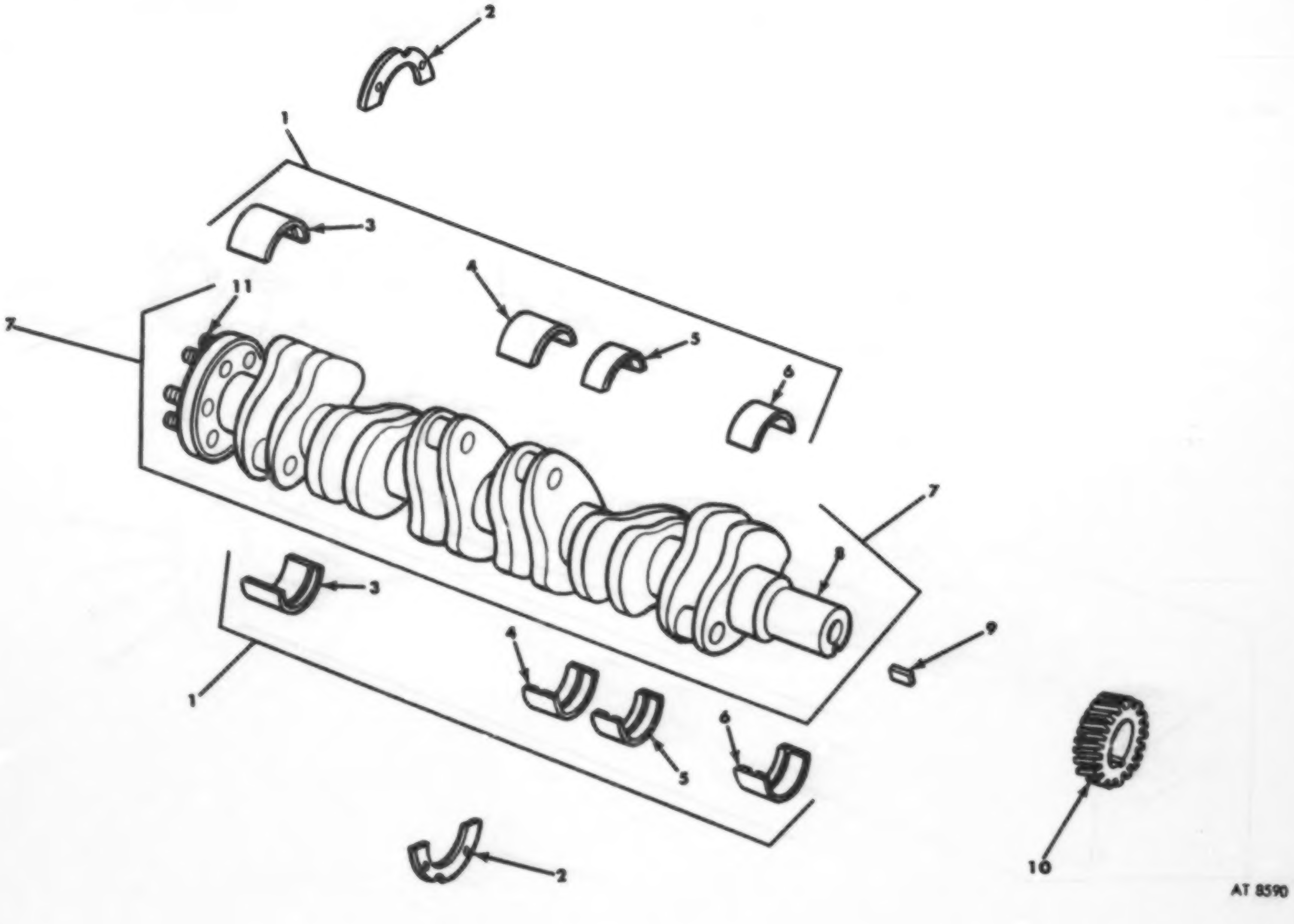
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Figure B–12. Crankshaft and main bearings.

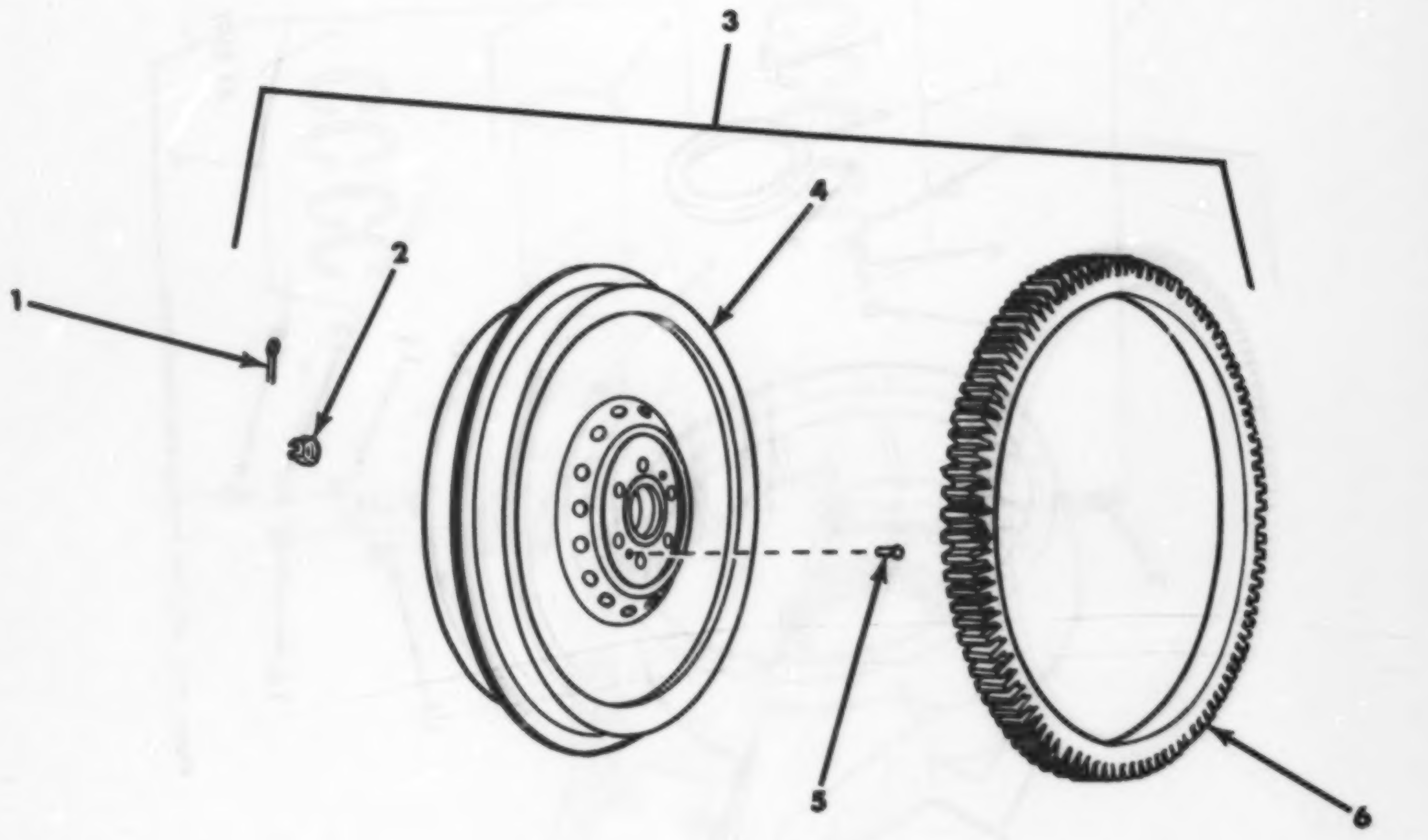

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Figure B-13. Flywheel assembly—exploded view.

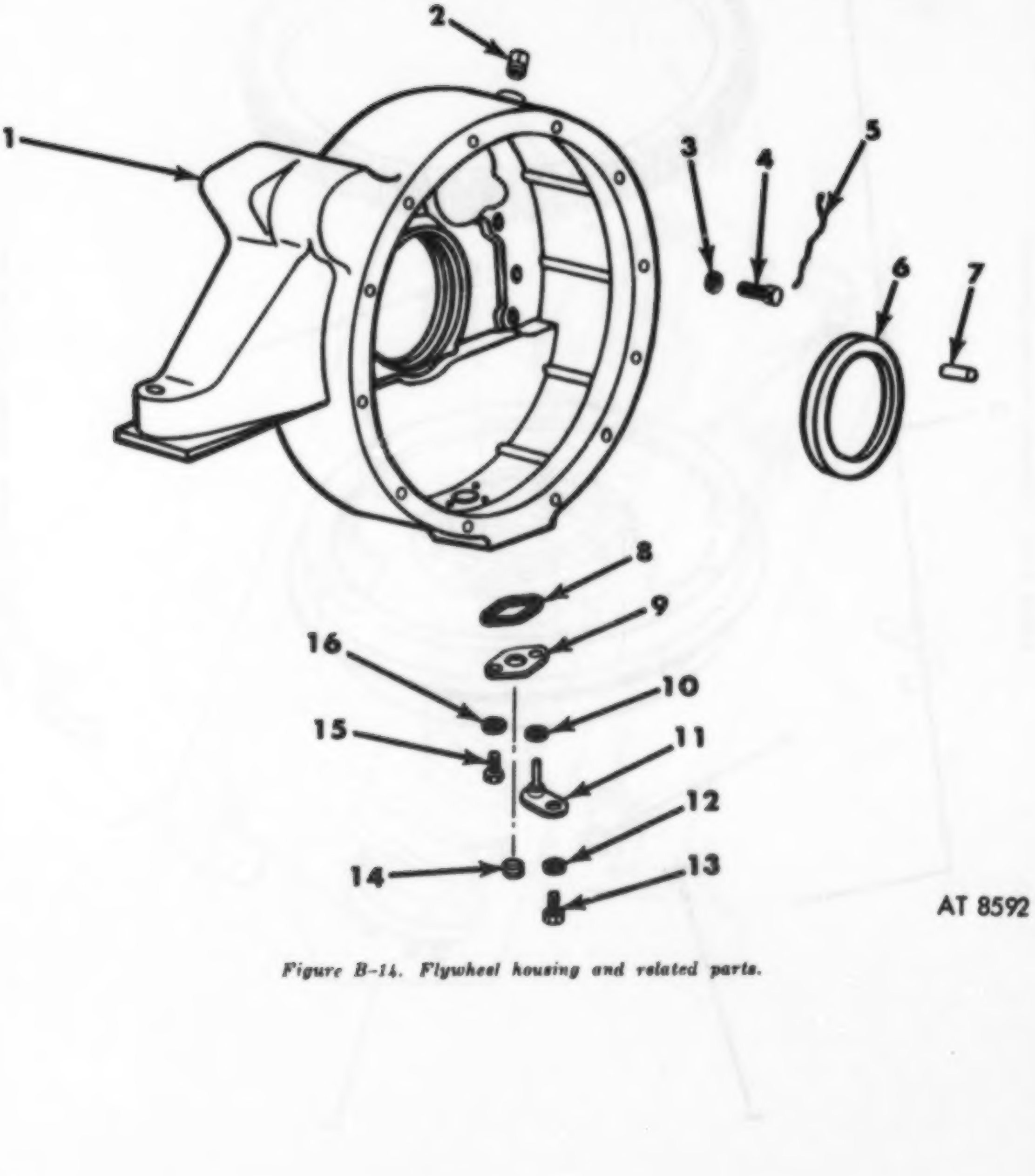
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Figure B-14. Flywheel housing and related parts.

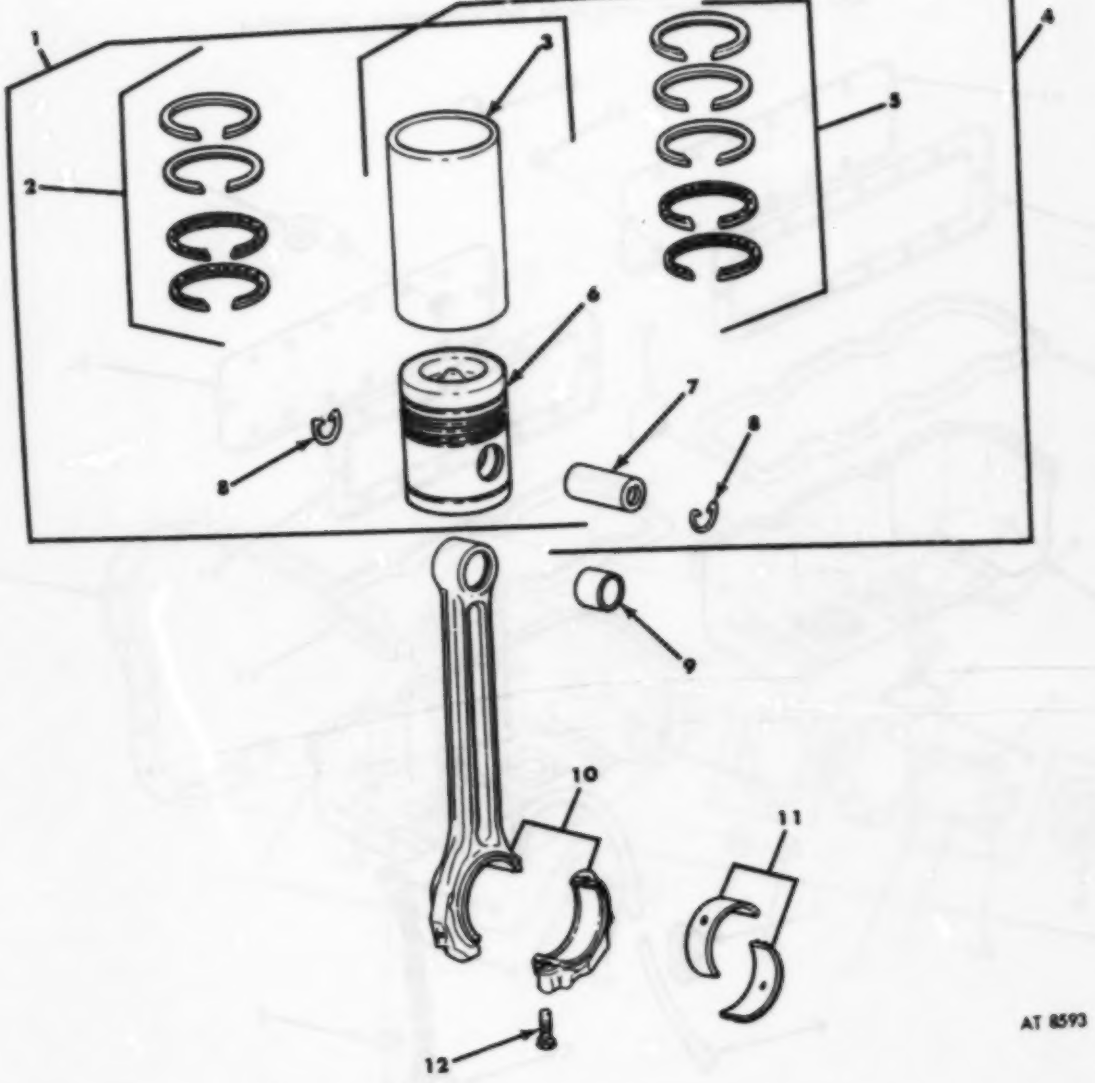
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Figure B-15. Engine piston, rings, connecting rod and sleeve.

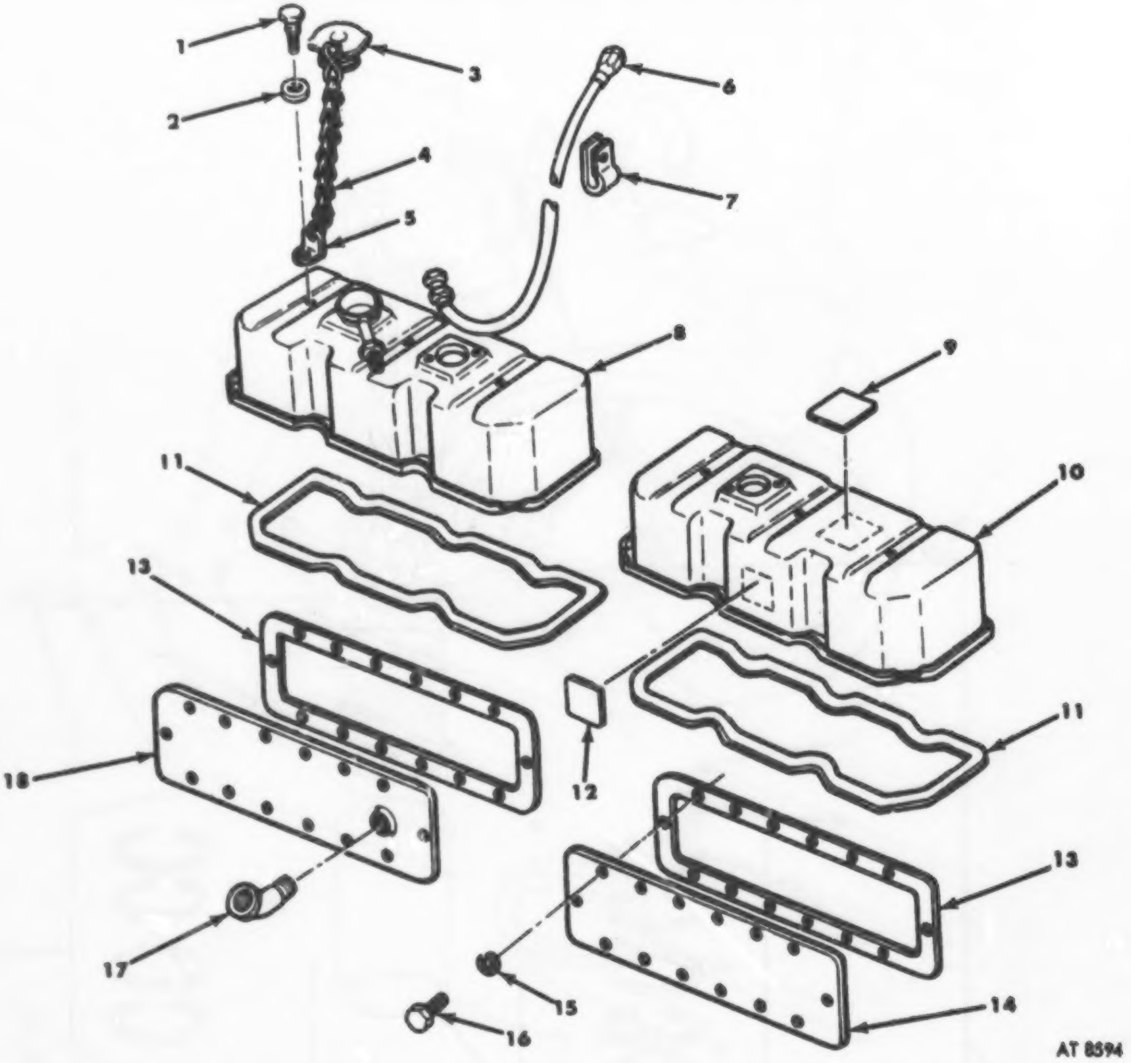
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Figure B16. Rocker arm and valve lifter covers—exploded view.

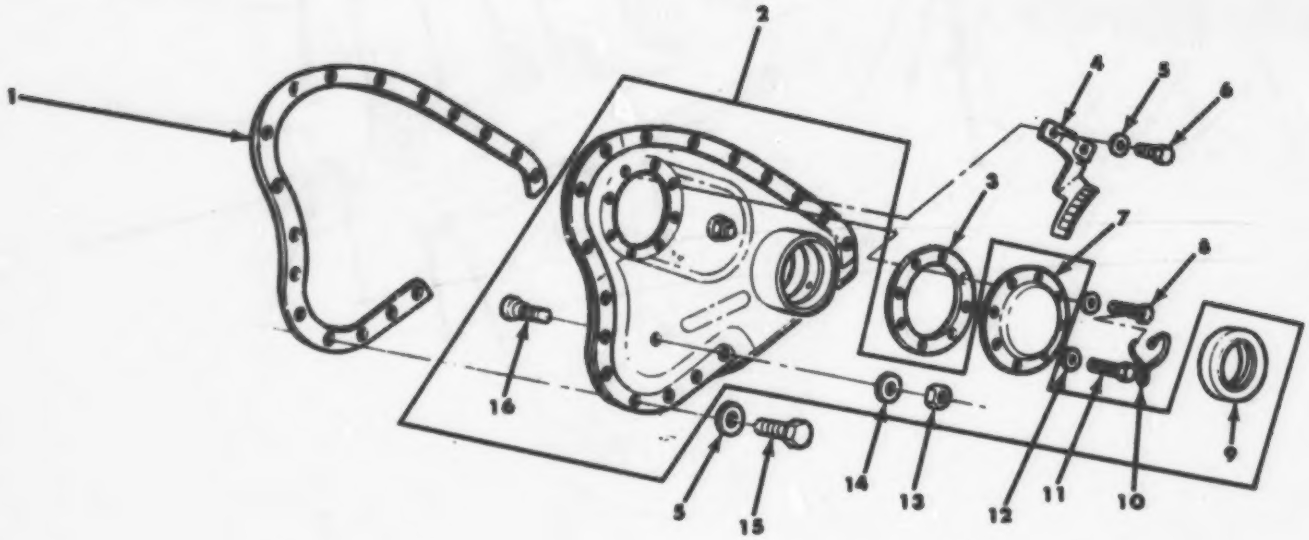
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Figure B–17. Timing gear cover—exploded view.

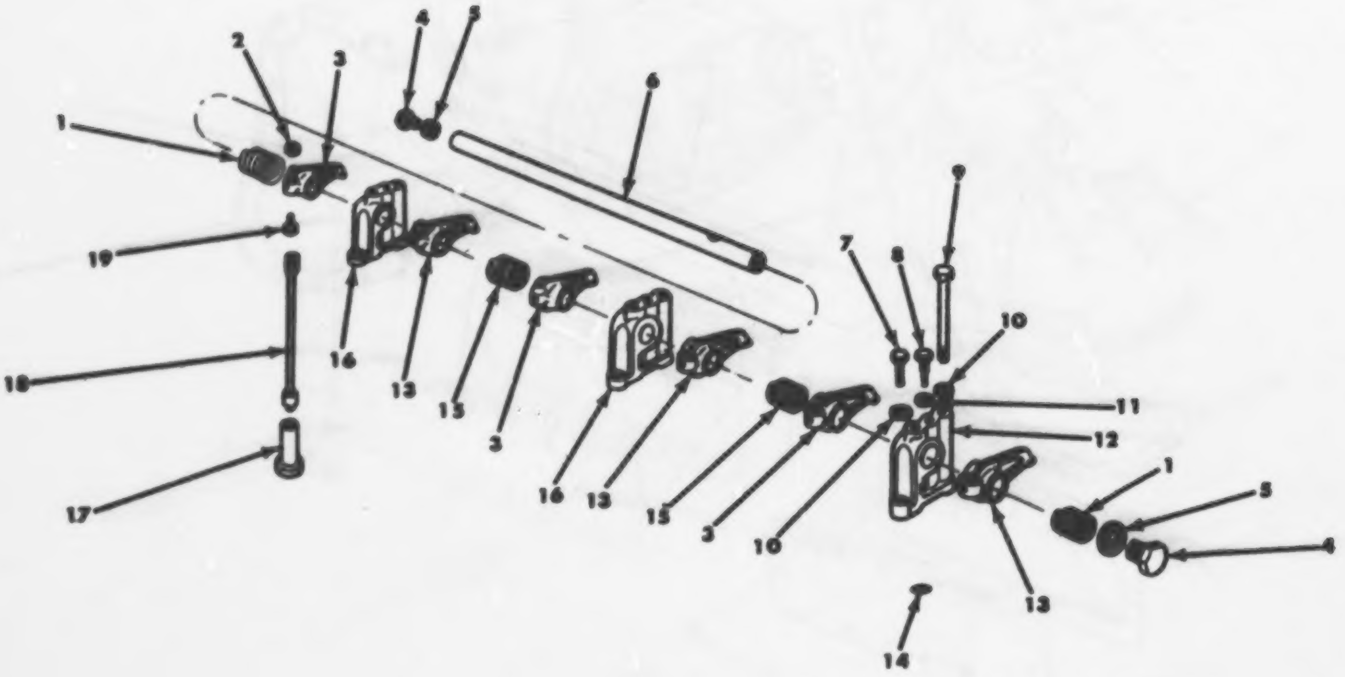
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Figure B-18. Engine valve push rods, rocker arm assembly and related parts.

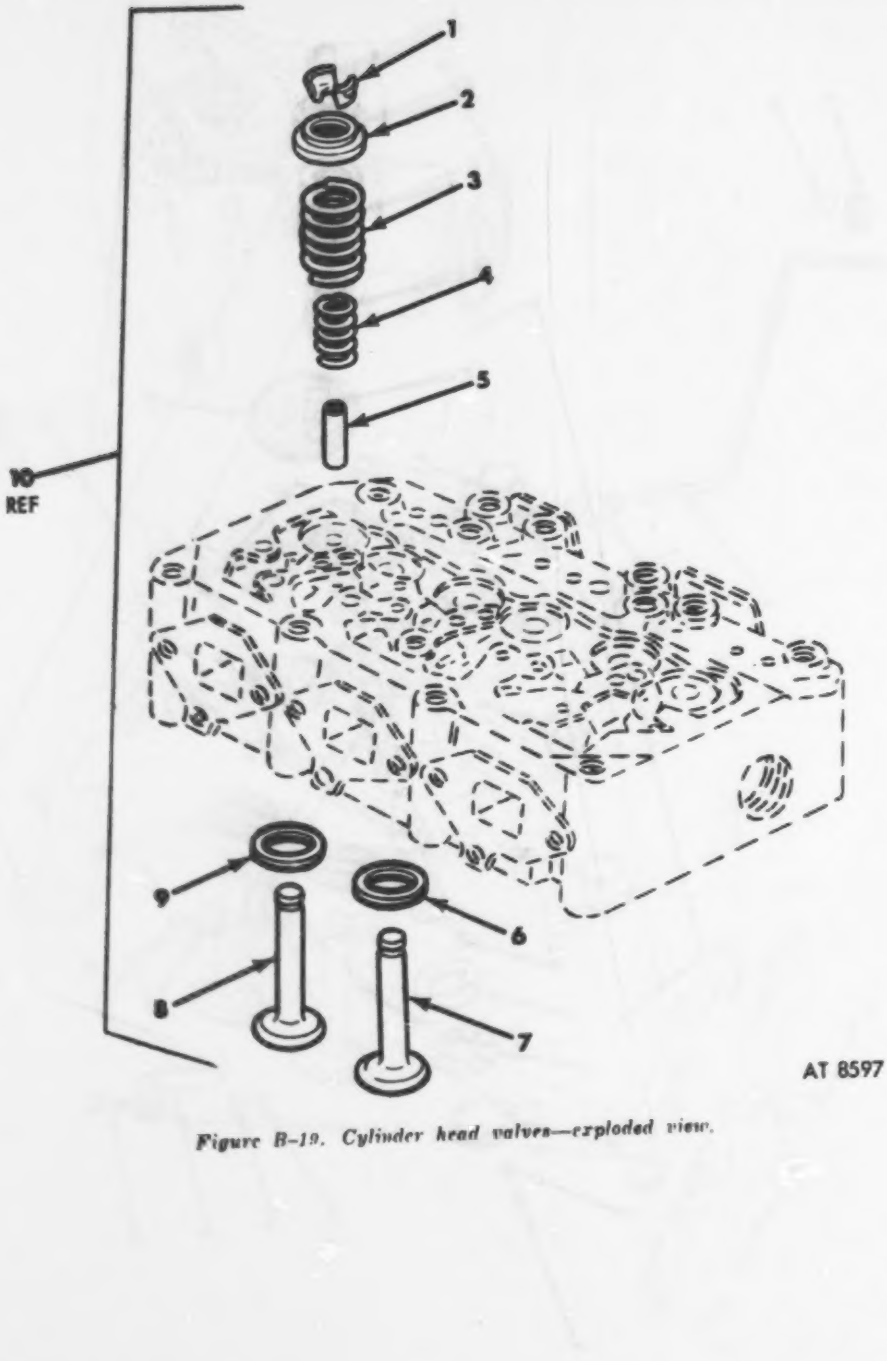
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Figure B-19. Cylinder head valves—exploded view.

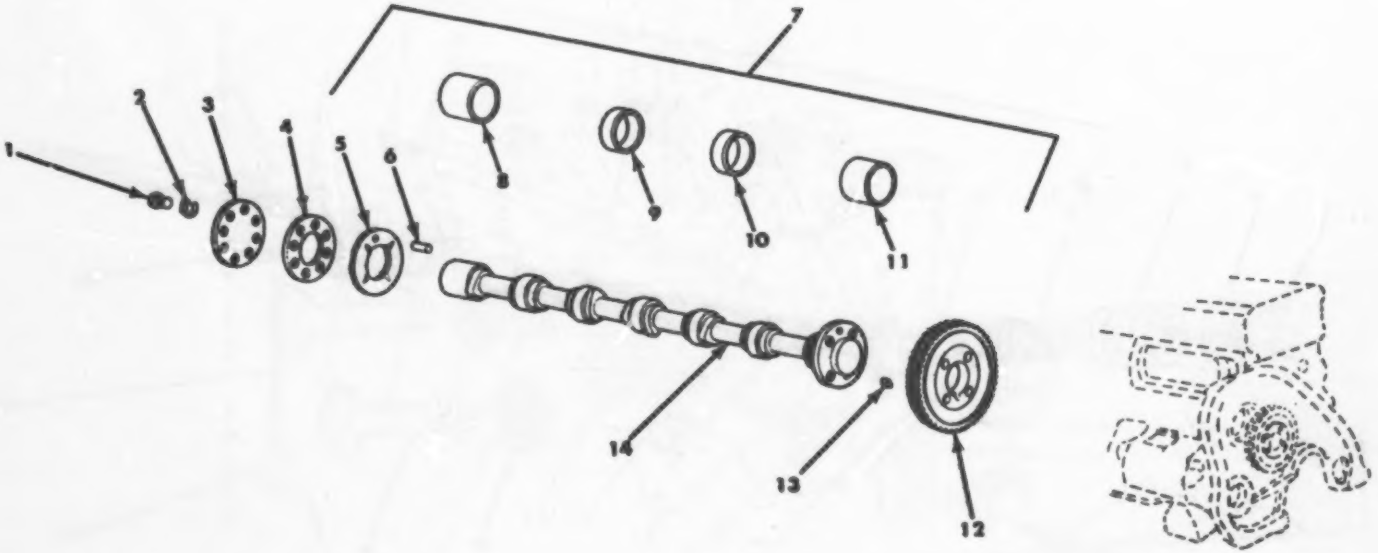
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Figure B-20. Camshaft, bearings and related parts.

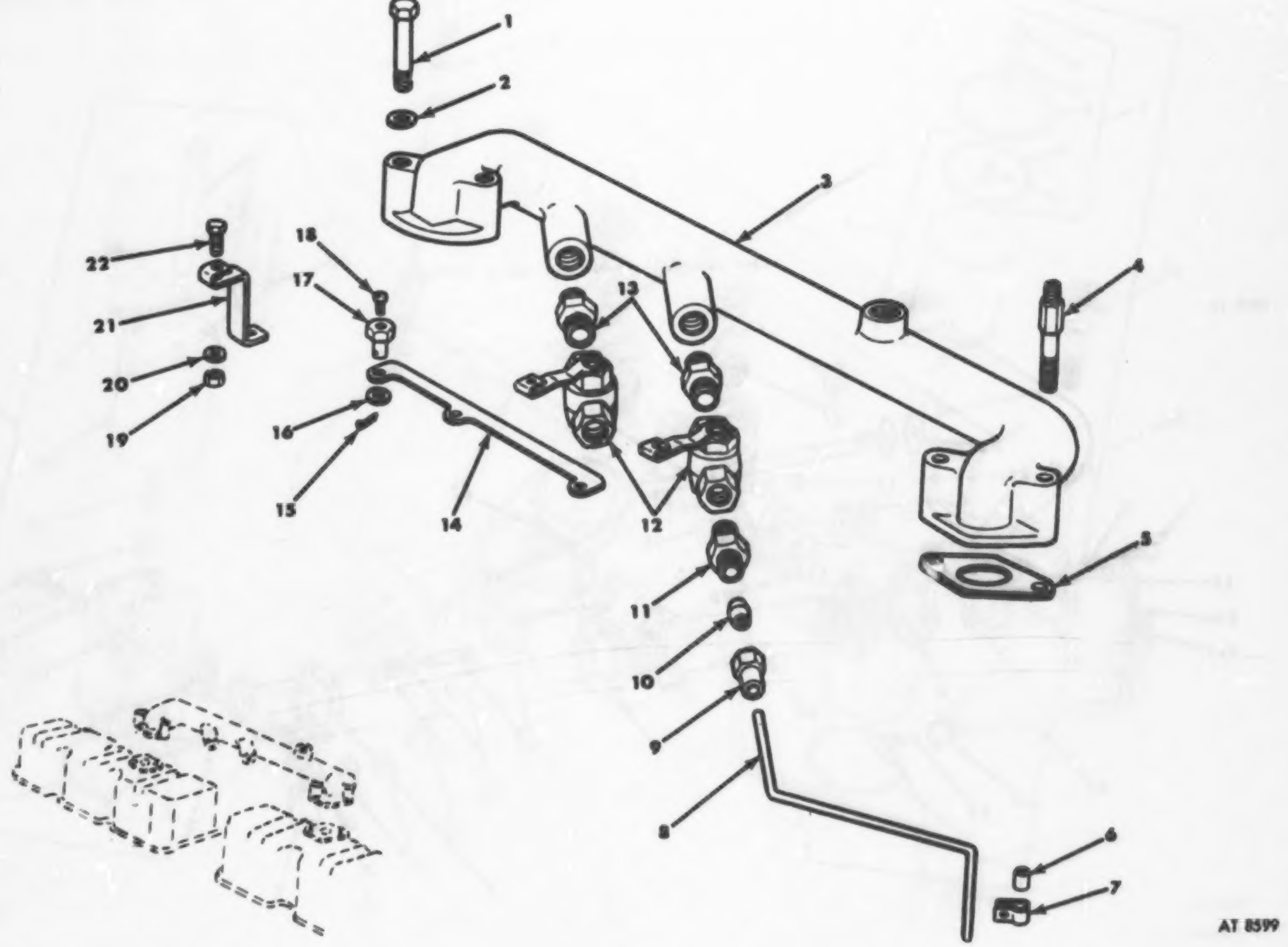
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Figure B-21. Crankcase breather and related parts.

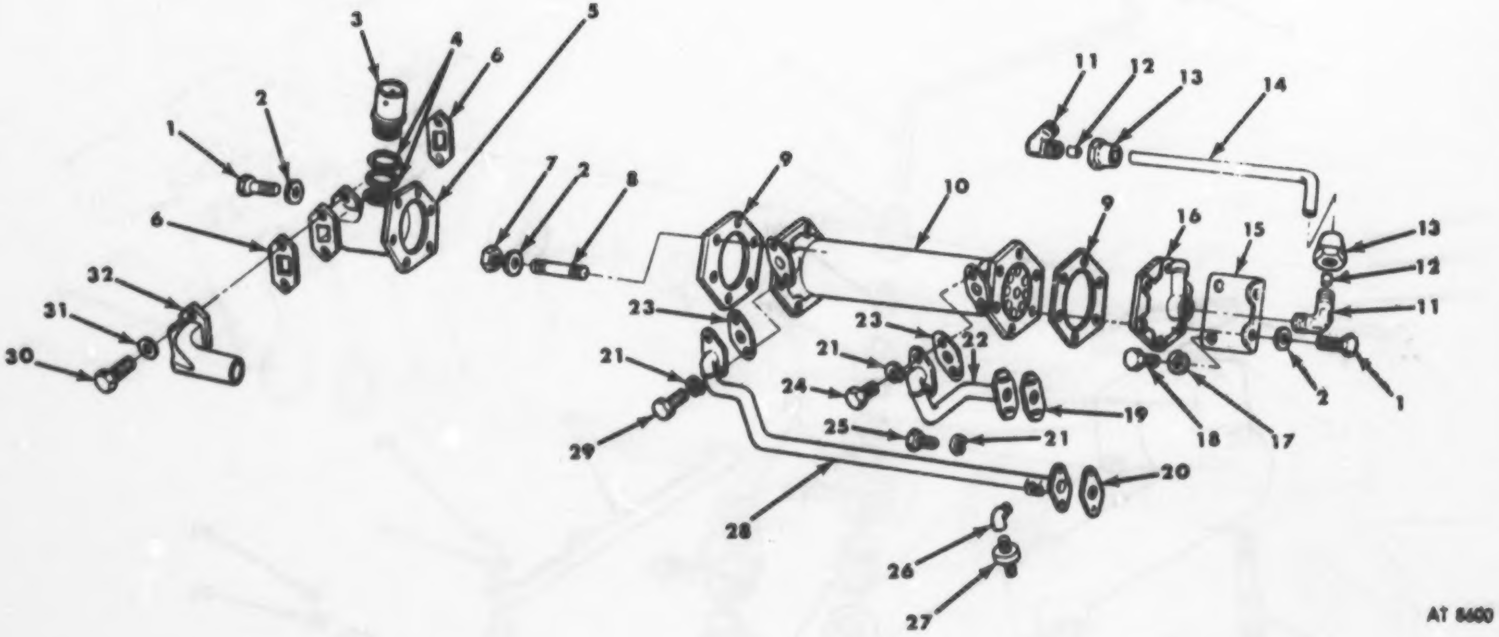
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Figure B-22. Oil cooler—exploded view.

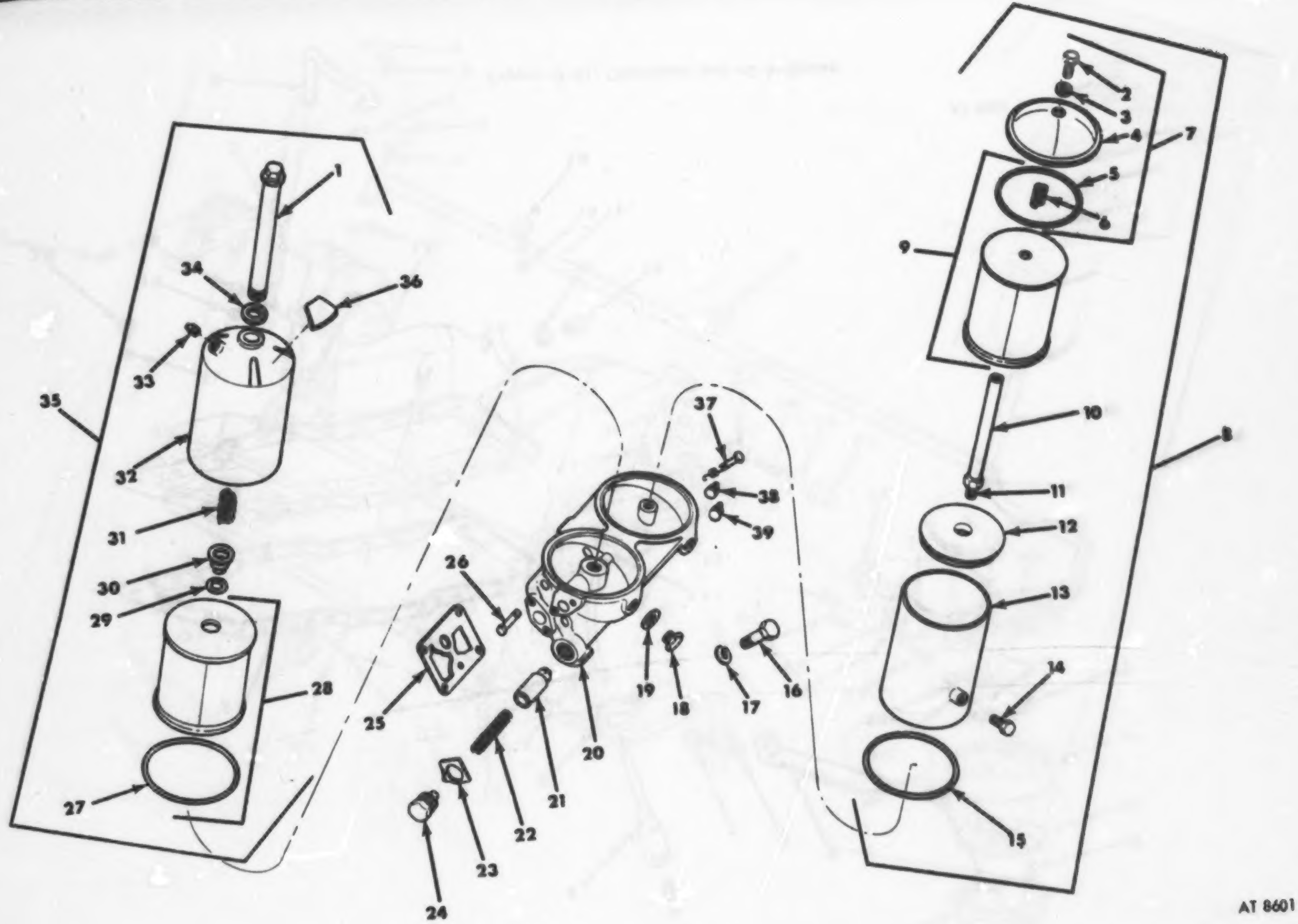
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Figure B-28. Lube oil filter—exploded view.

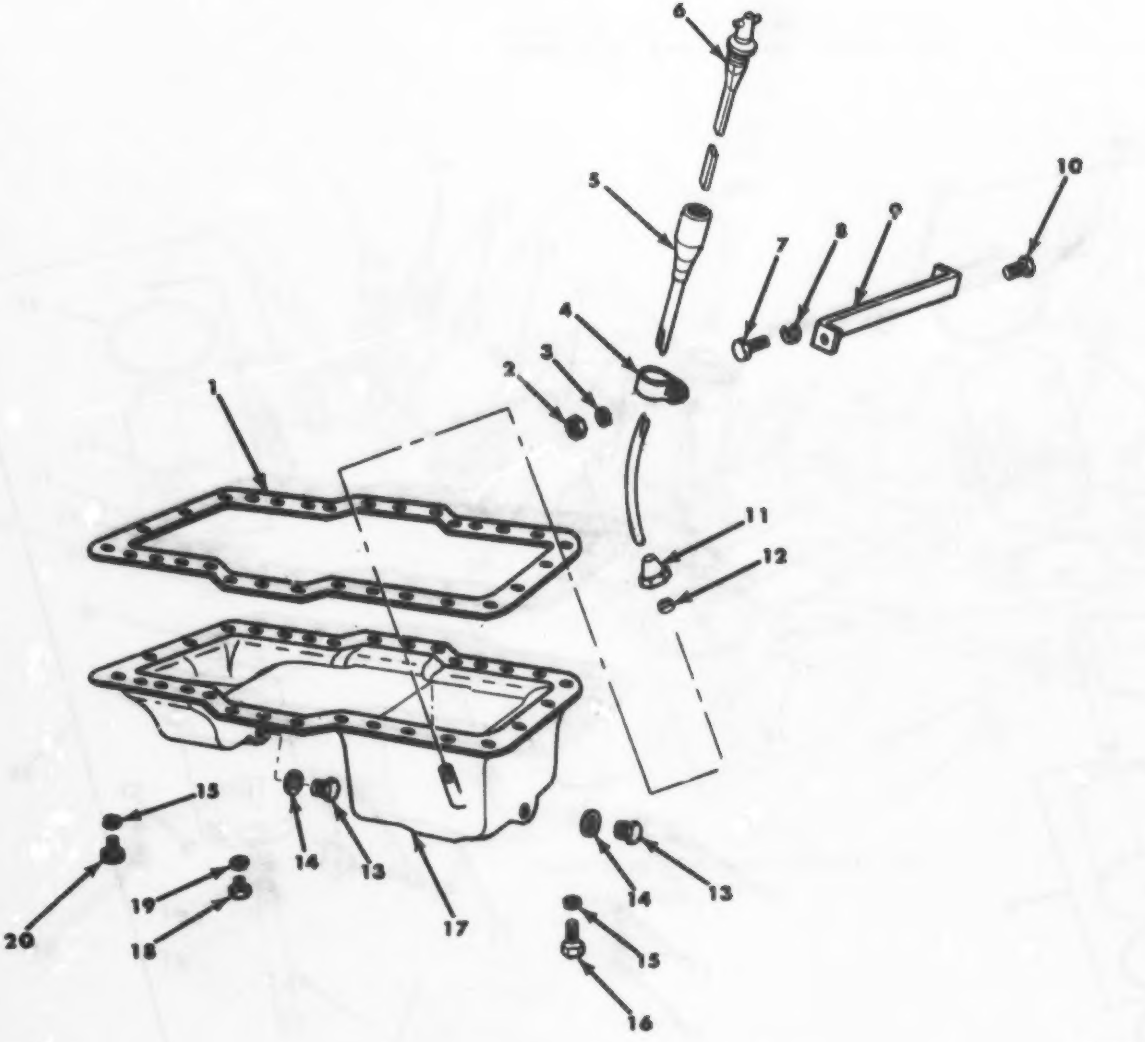
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Figure B–24. Crankcase and oil indicator.

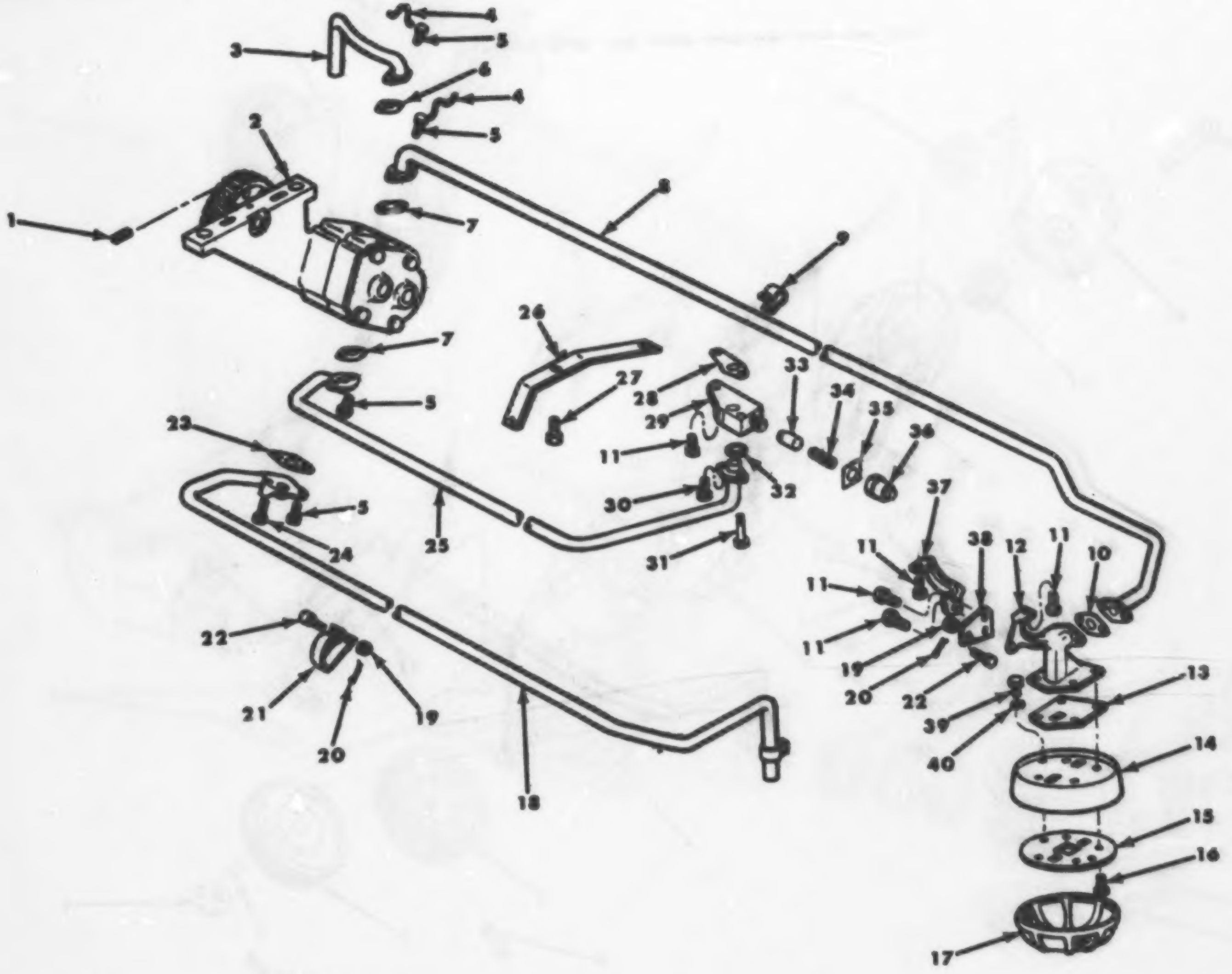
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Figure B–25. Oil inlet sump and related parts.

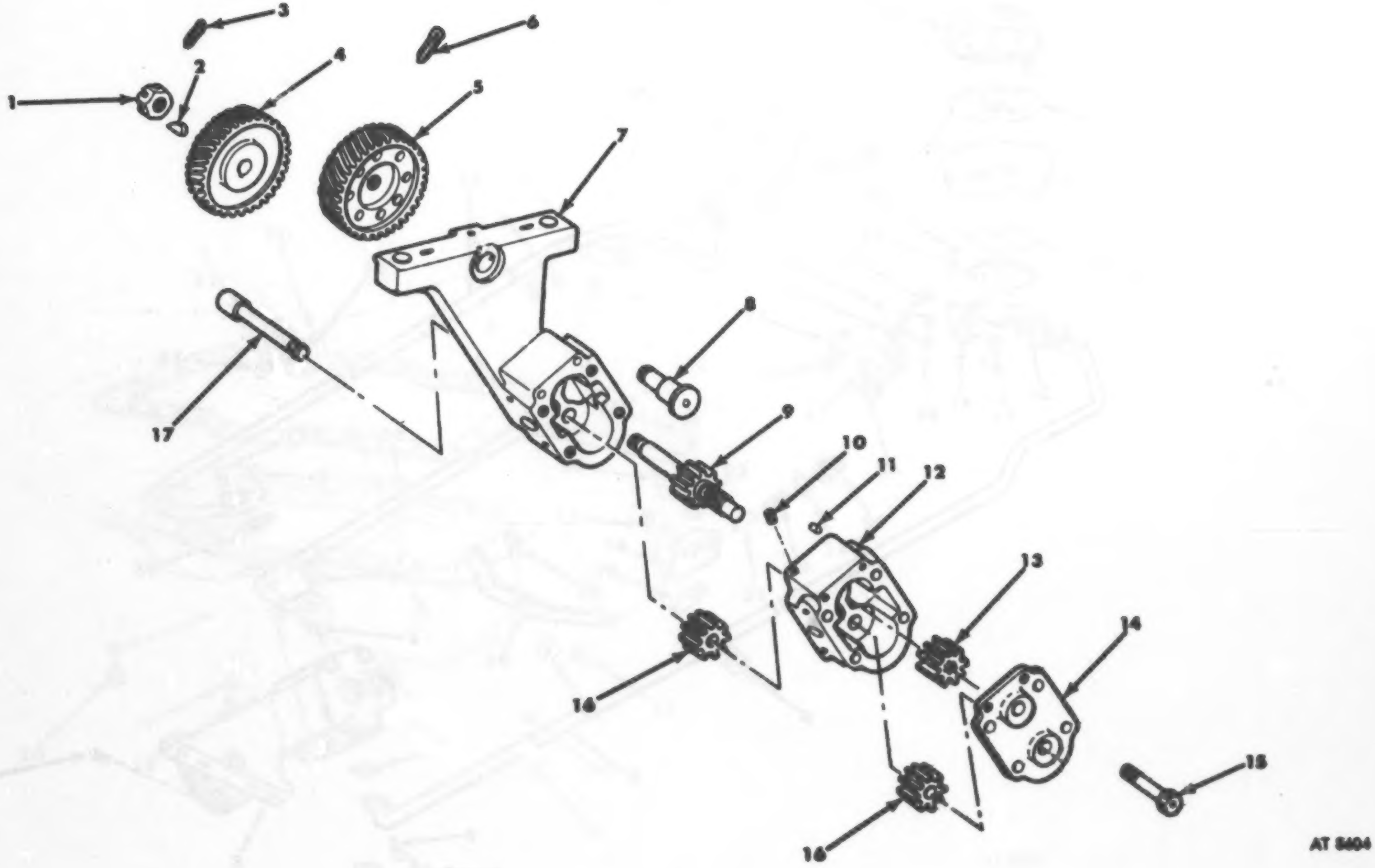
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Figure B-86. Oil pump assembly—exploded view.

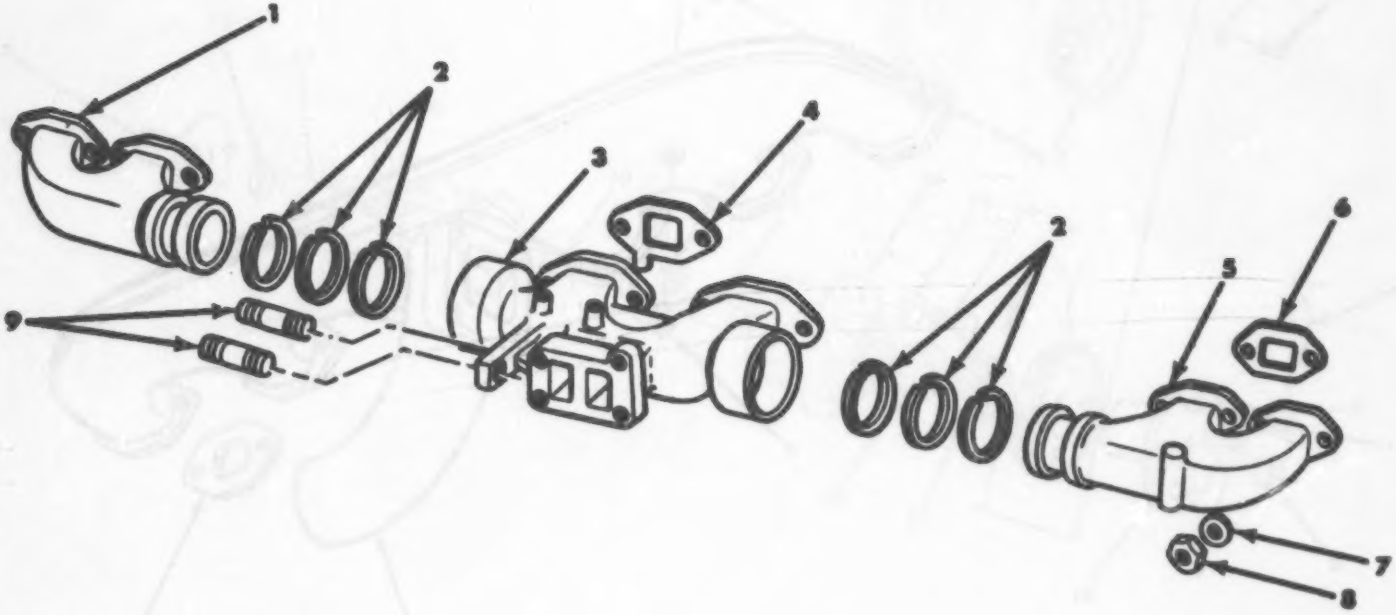
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Figure B–87. Exhaust manifold—exploded view.

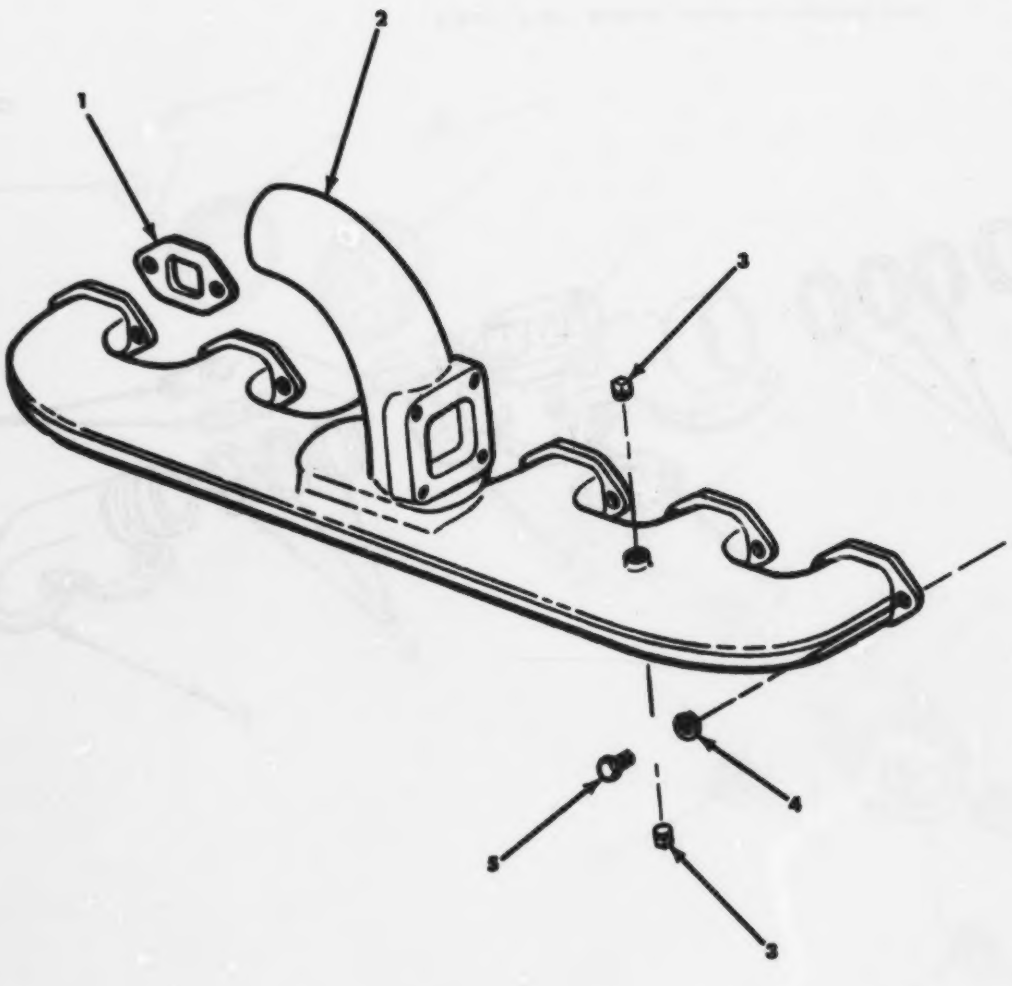

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Figure B–28. Intake manifold and related parts.

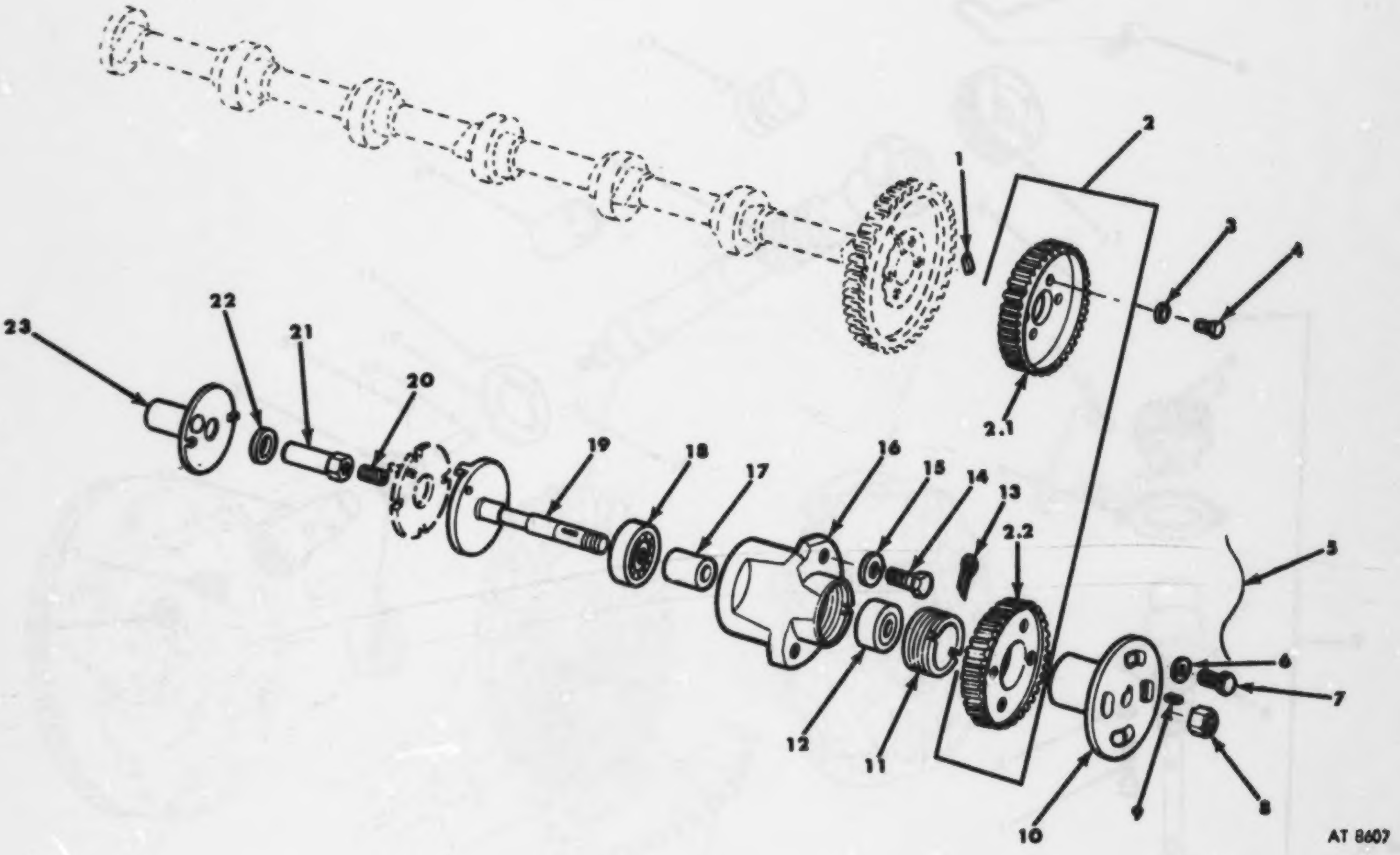
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Figure B-29. Injection pump drive—exploded view.

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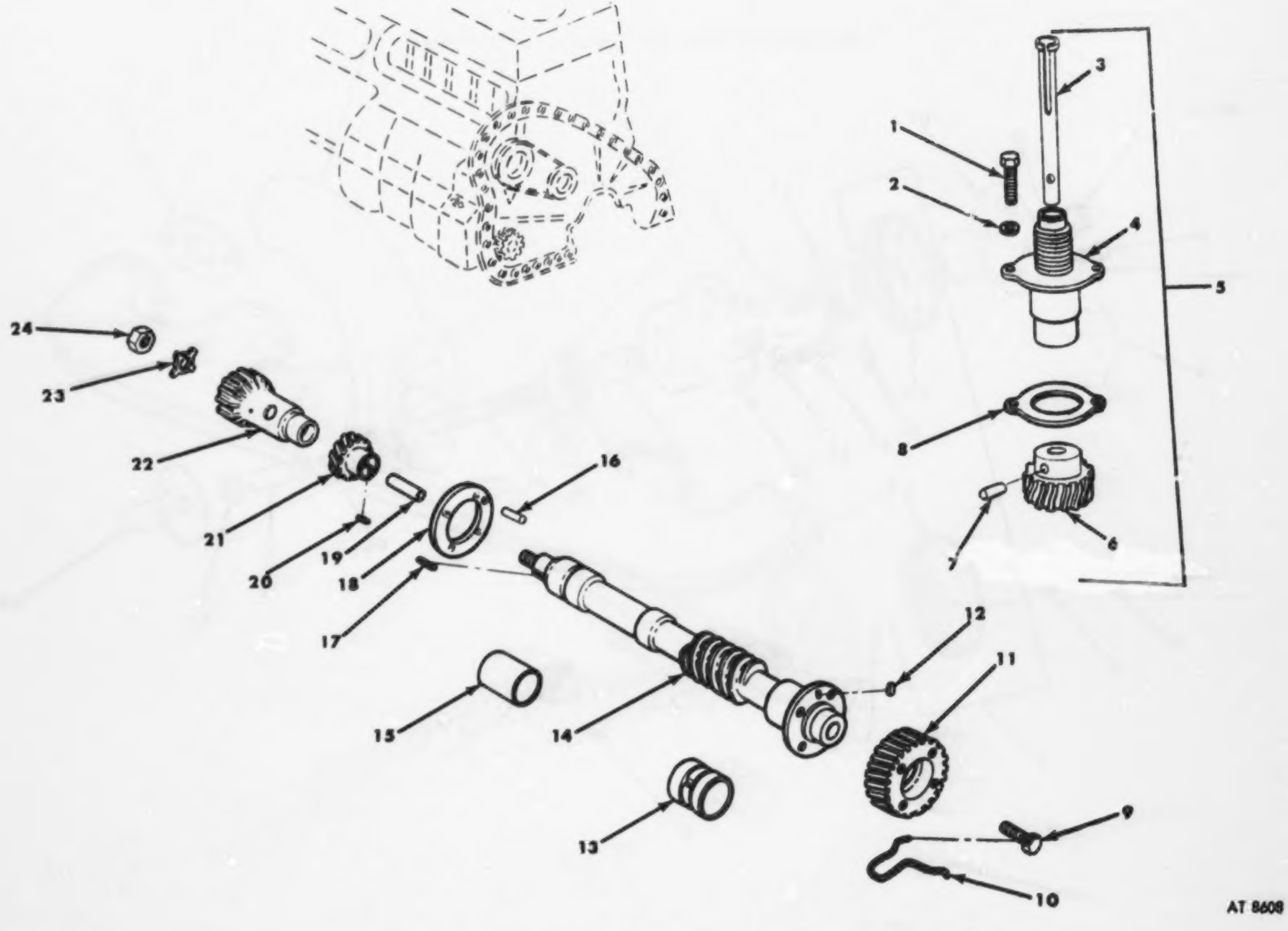
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Figure B–30. Auxiliary shaft and tachometer drive assembly—exploded view.

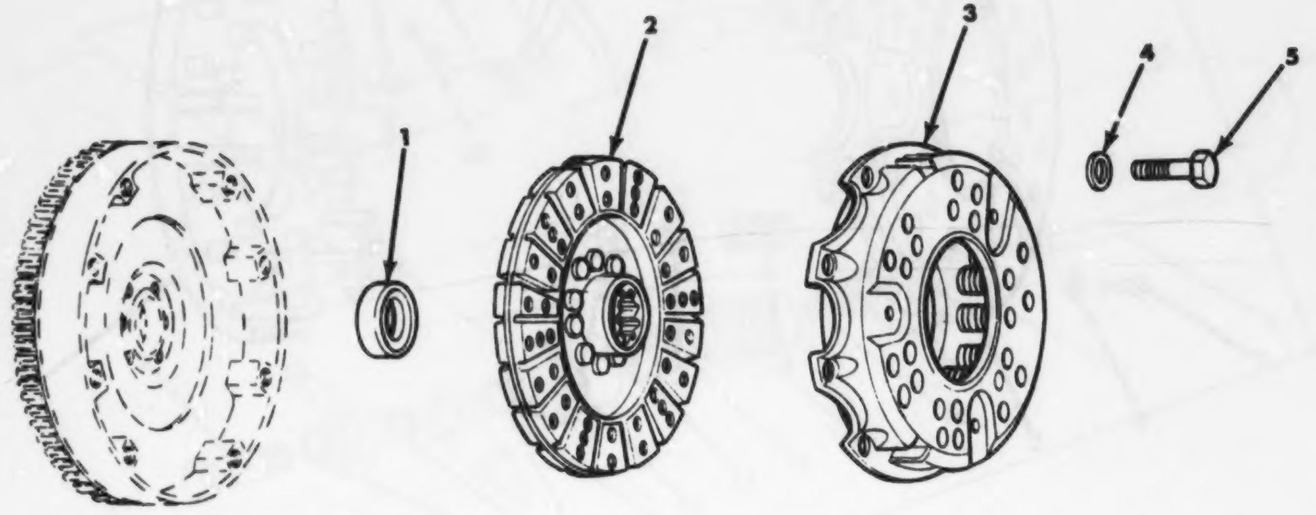
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Figure B–31. Clutch assembly—partial exploded view.

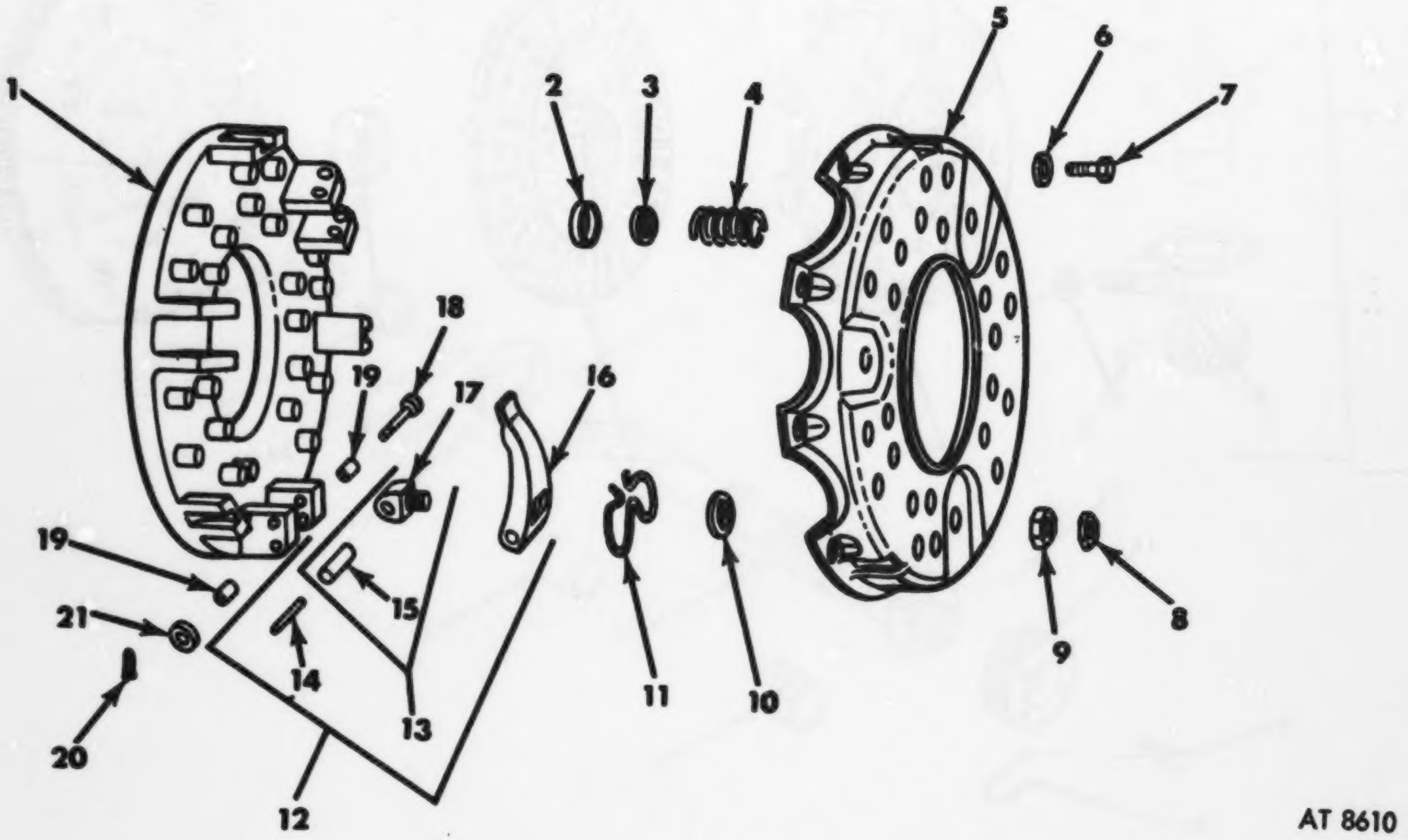
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Figure B-32. Pressure plate assembly—exploded view.

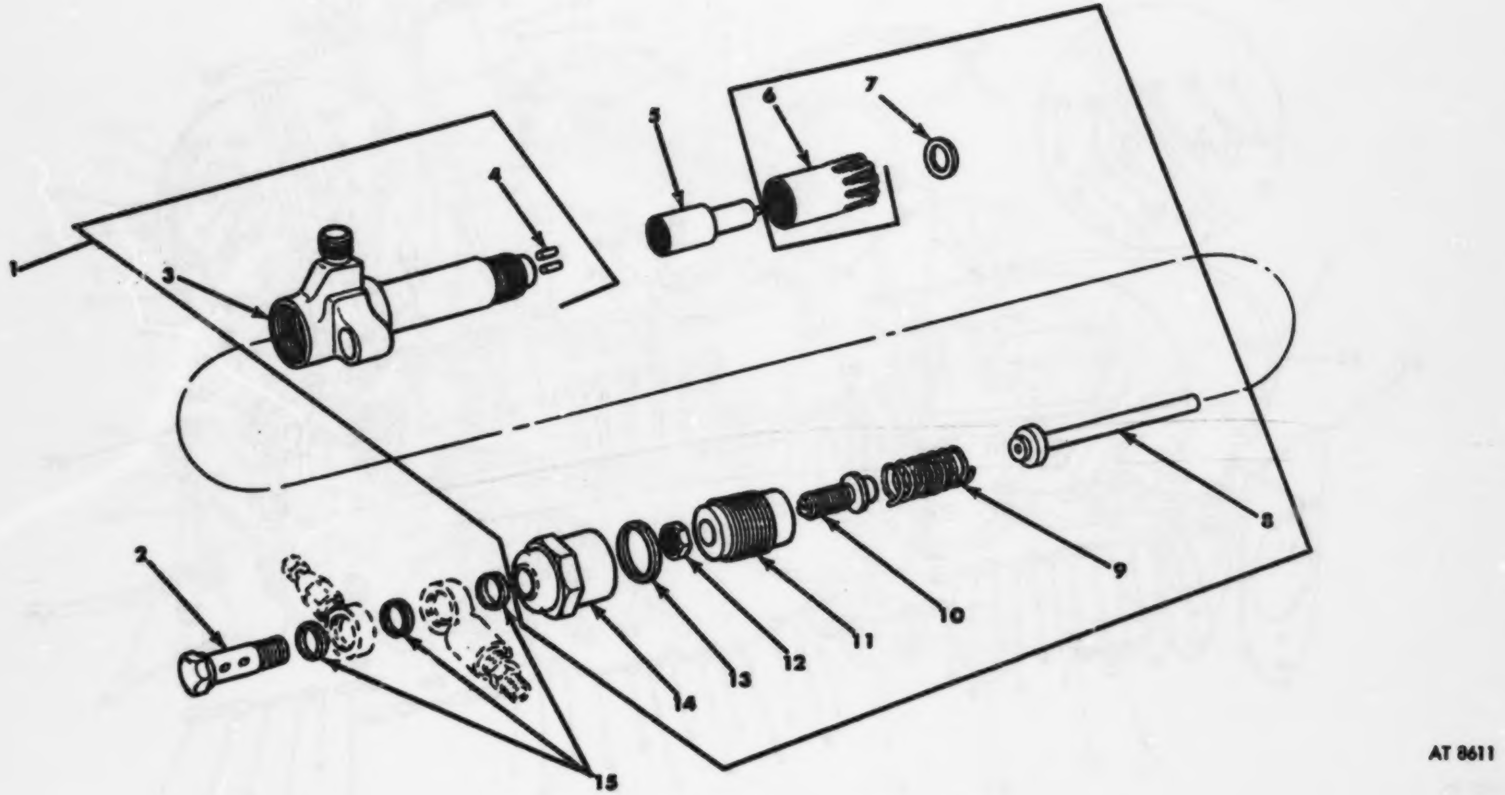
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Figure B–33. Nozzle and holder—exploded view.

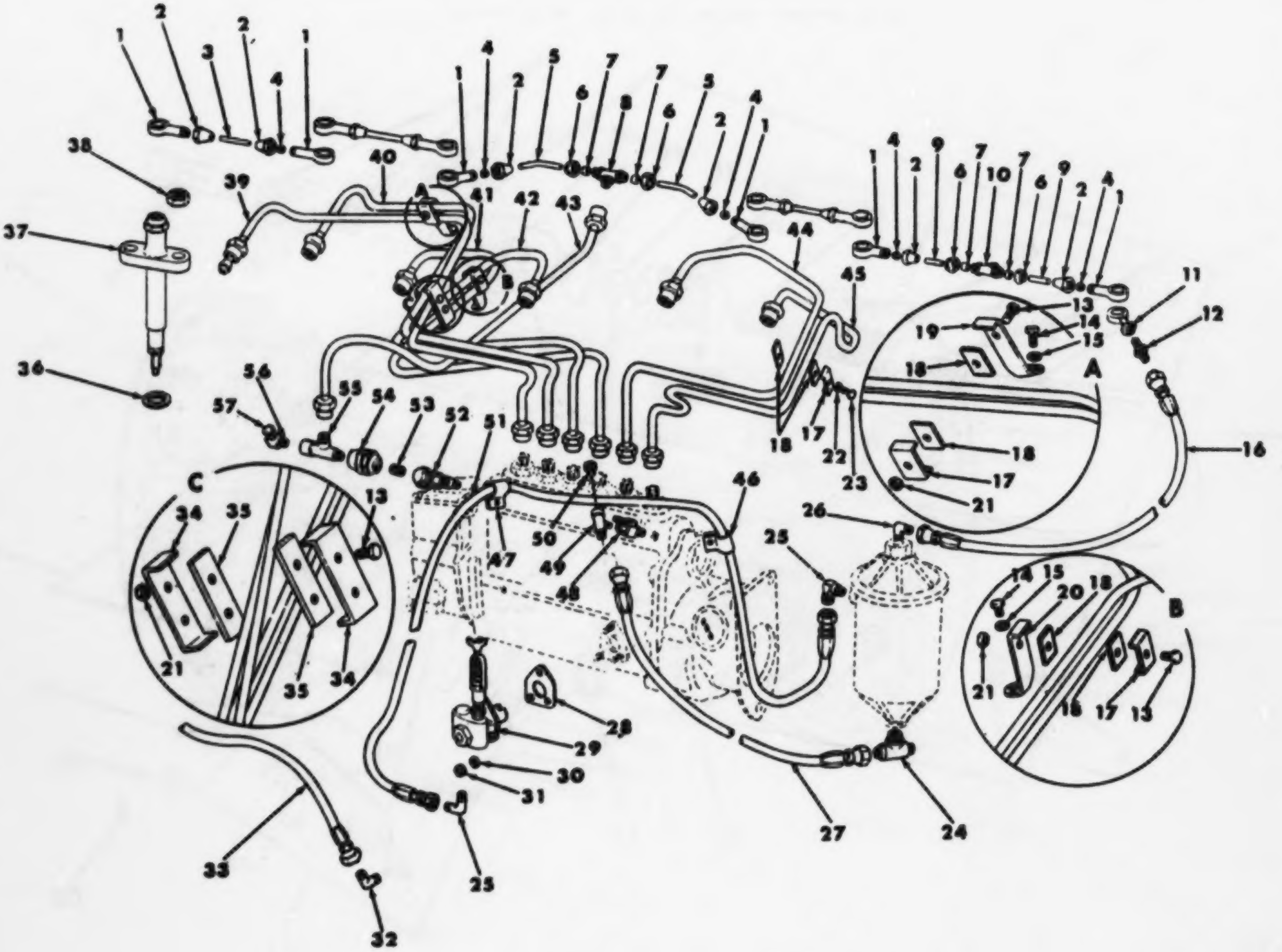
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Figure B-24. Fuel injection lines, brackets and related parts.

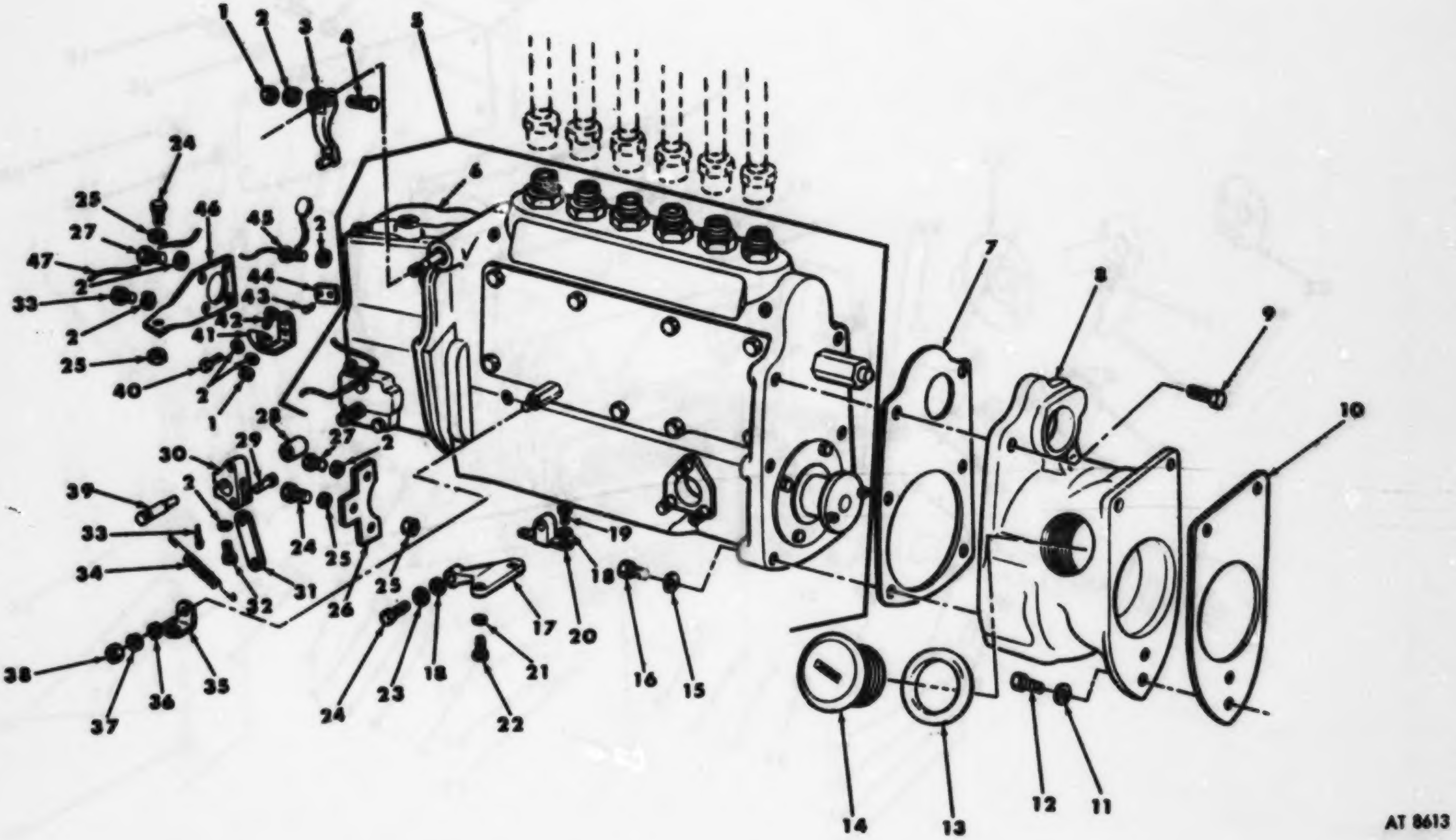
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Figure B-35. Fuel injection pump assembly and related parts.

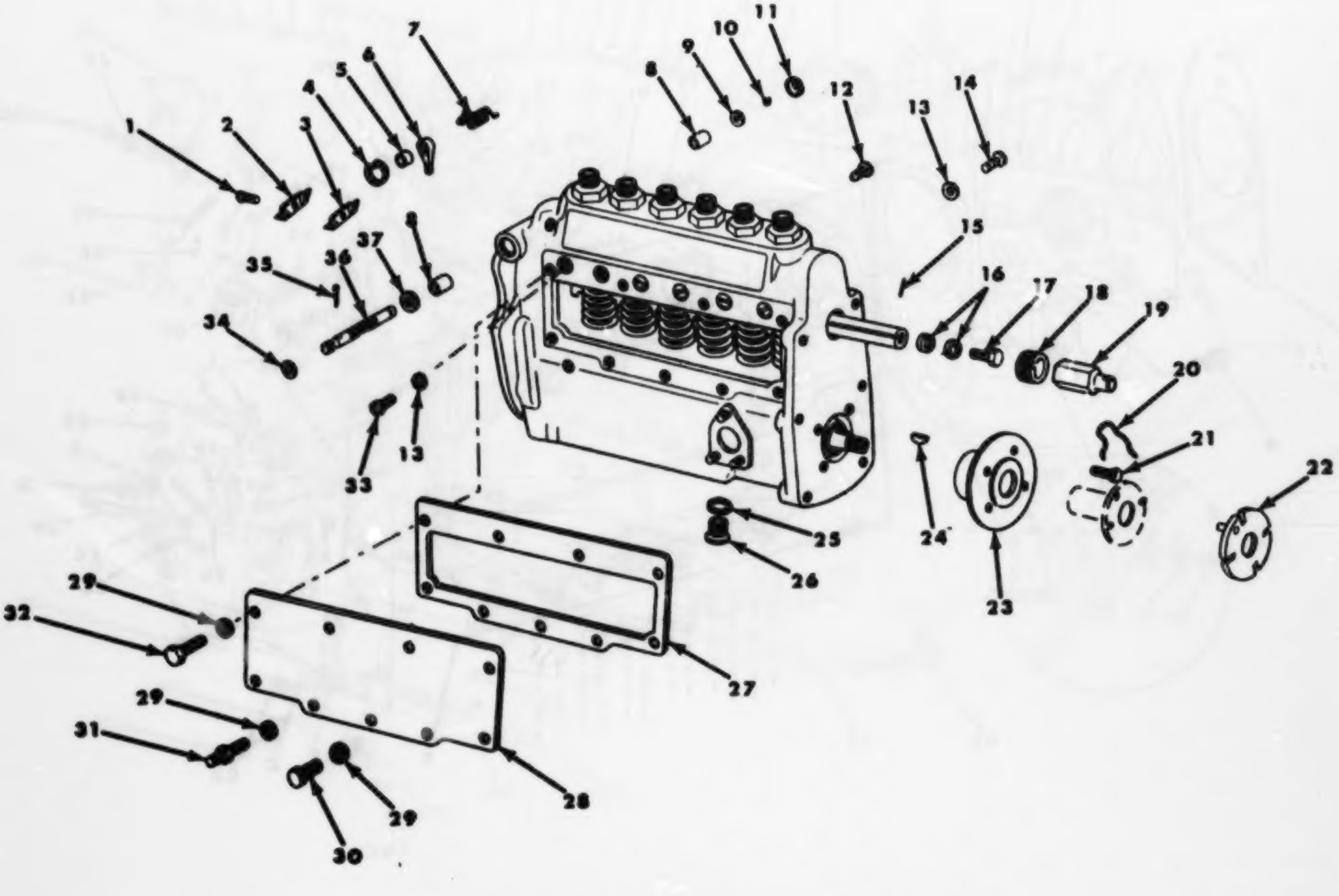
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Figure B–36. Fuel injection pump—exploded view.

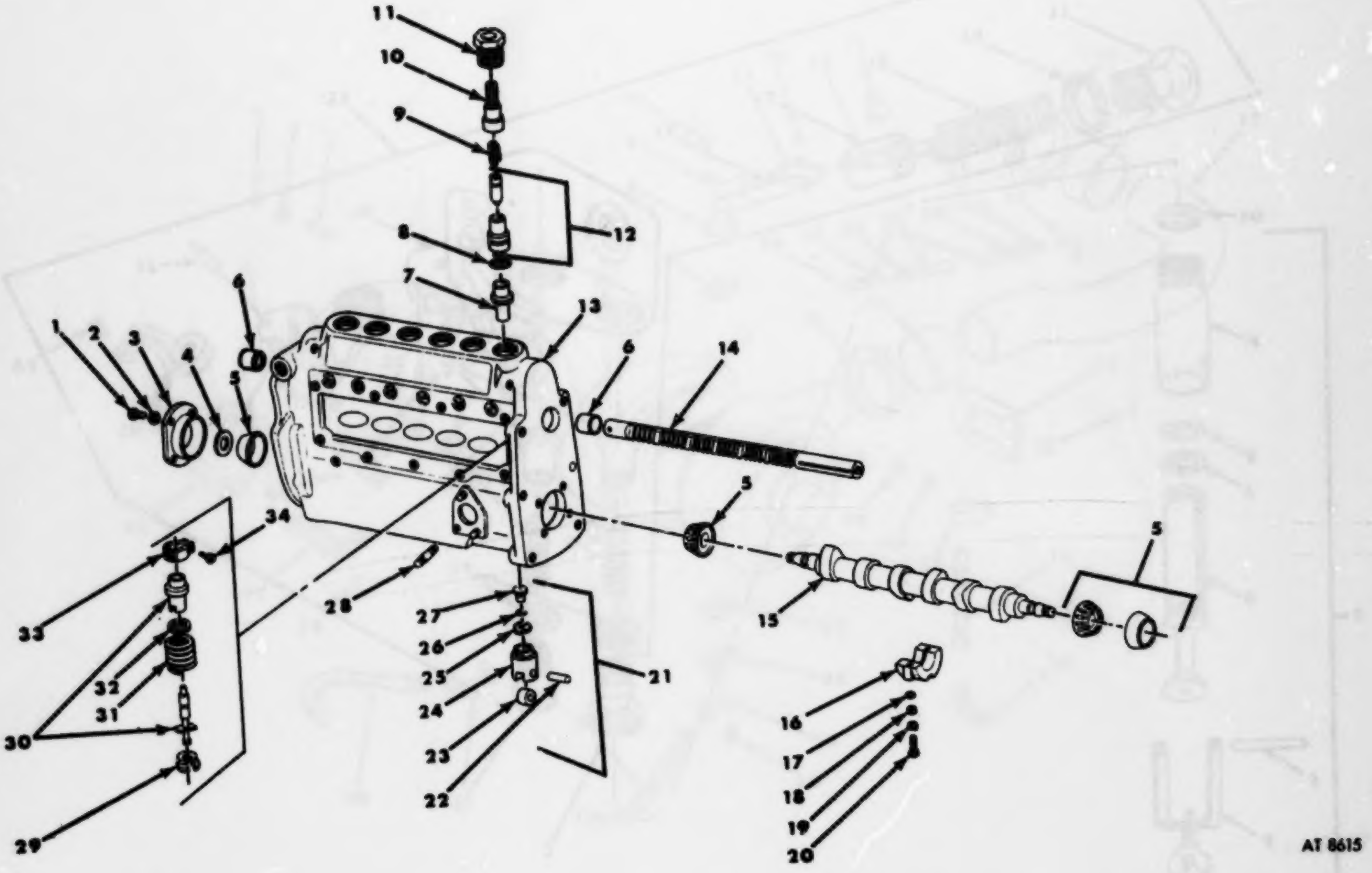
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Figure B-37. Fuel injection pump camshaft, valves and tappets—exploded view.

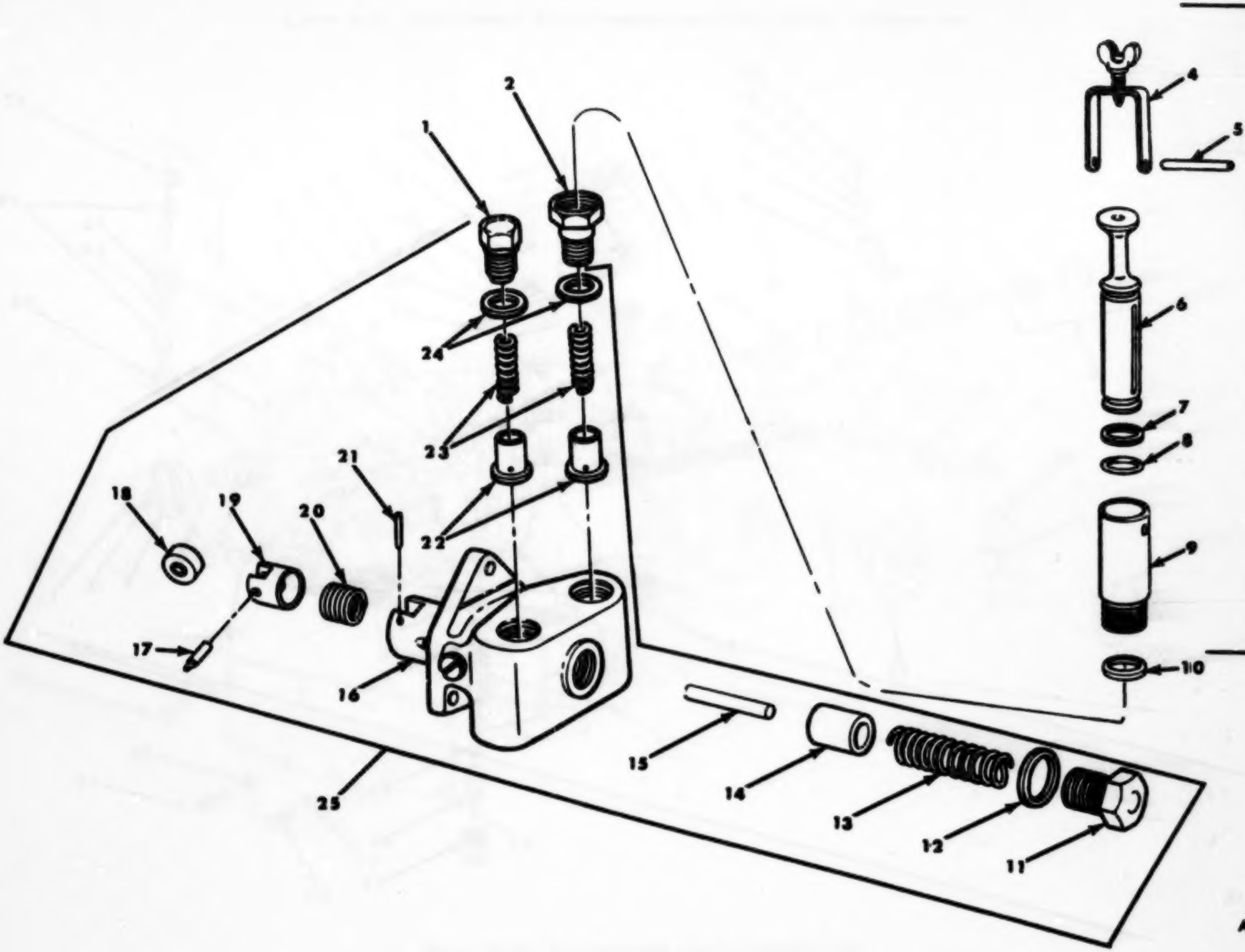
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Figure B-38. Transfer injection pump and hand primer—exploded view.

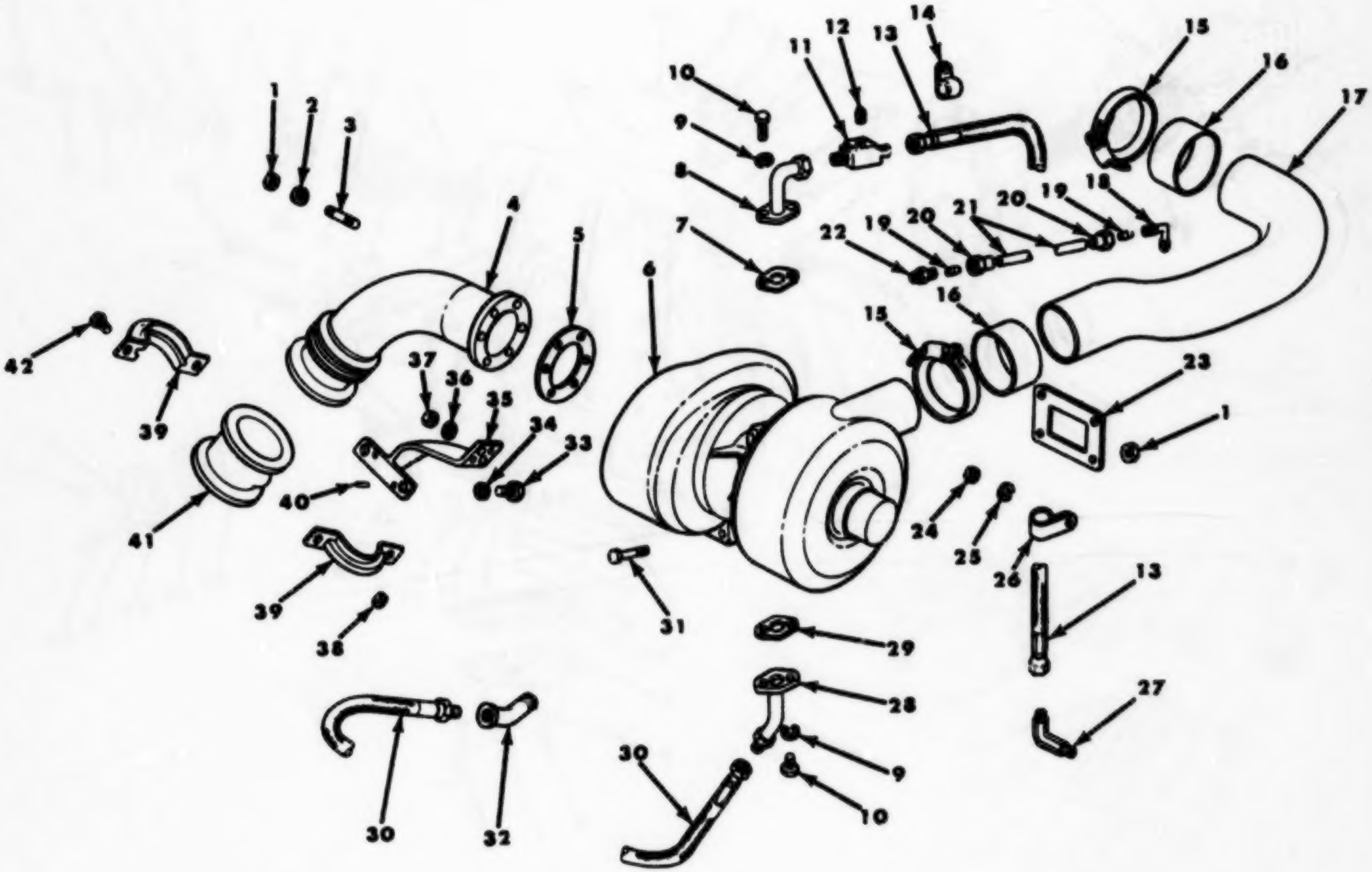
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Figure B–39. Turbocharger and related parts

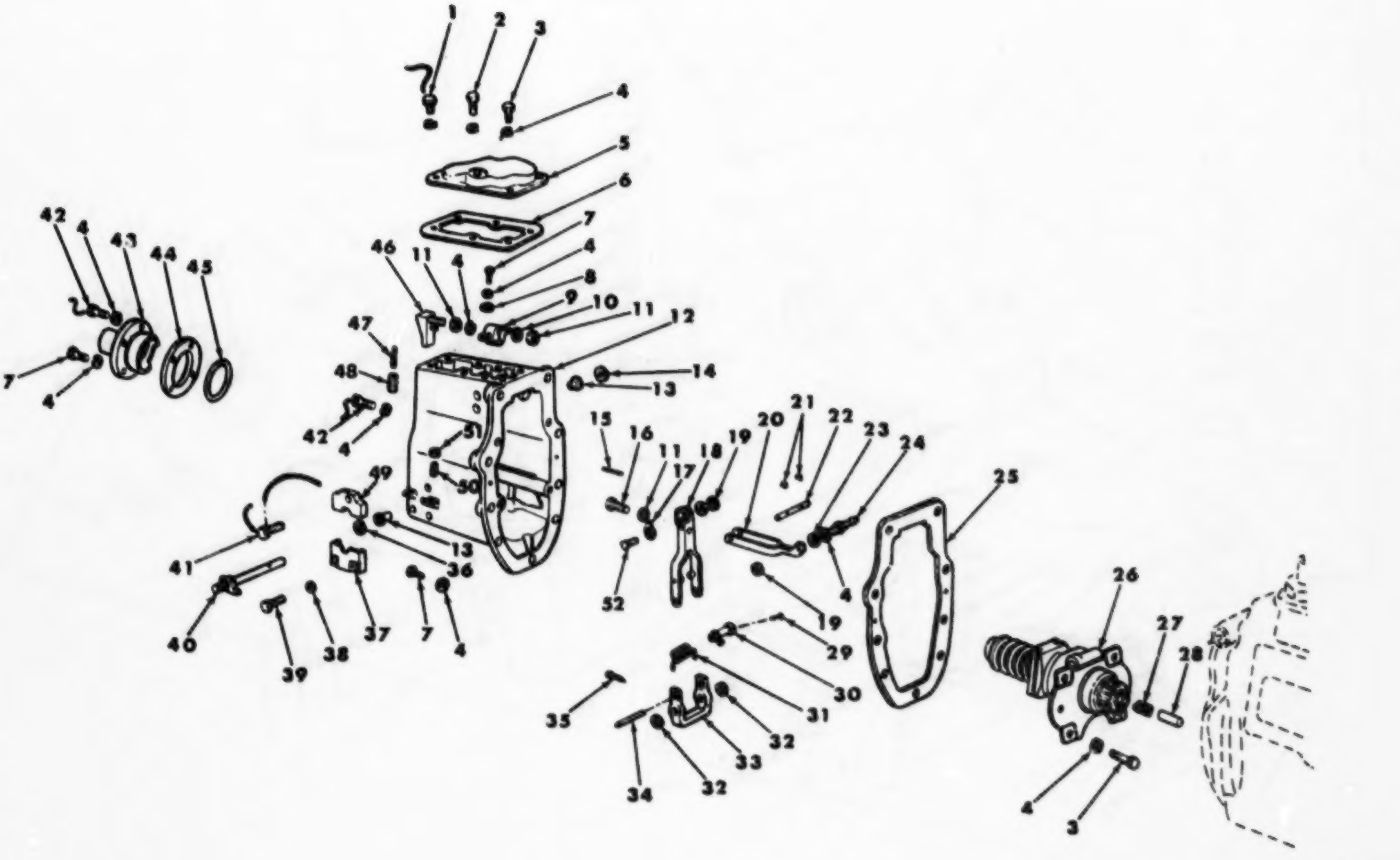
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Figure B-40. Governor, fuel injection—exploded view.

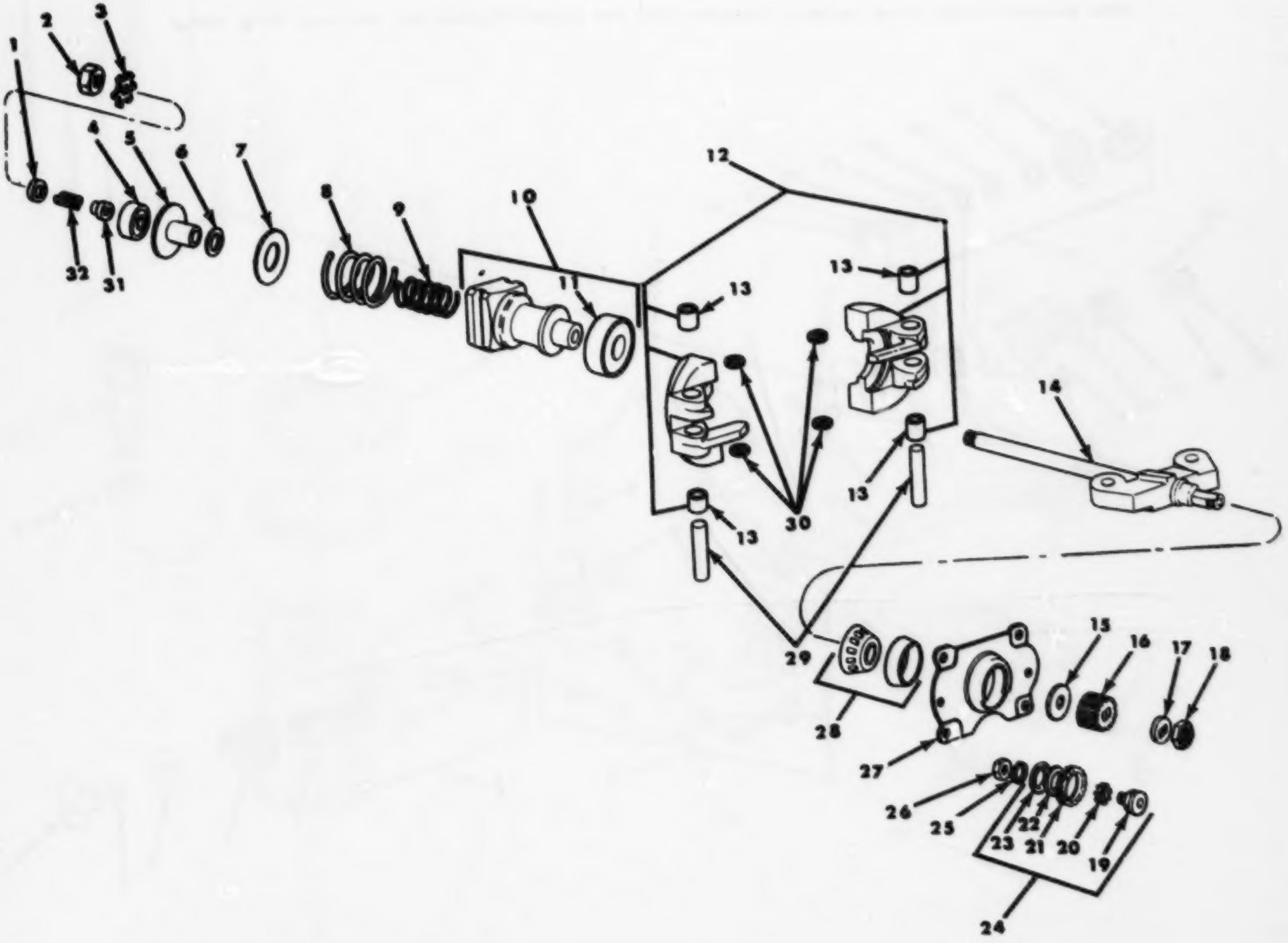
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Figure B–41. Governor, fuel injection, weight and shaft assembly—Governor Model 5037B—exploded view.

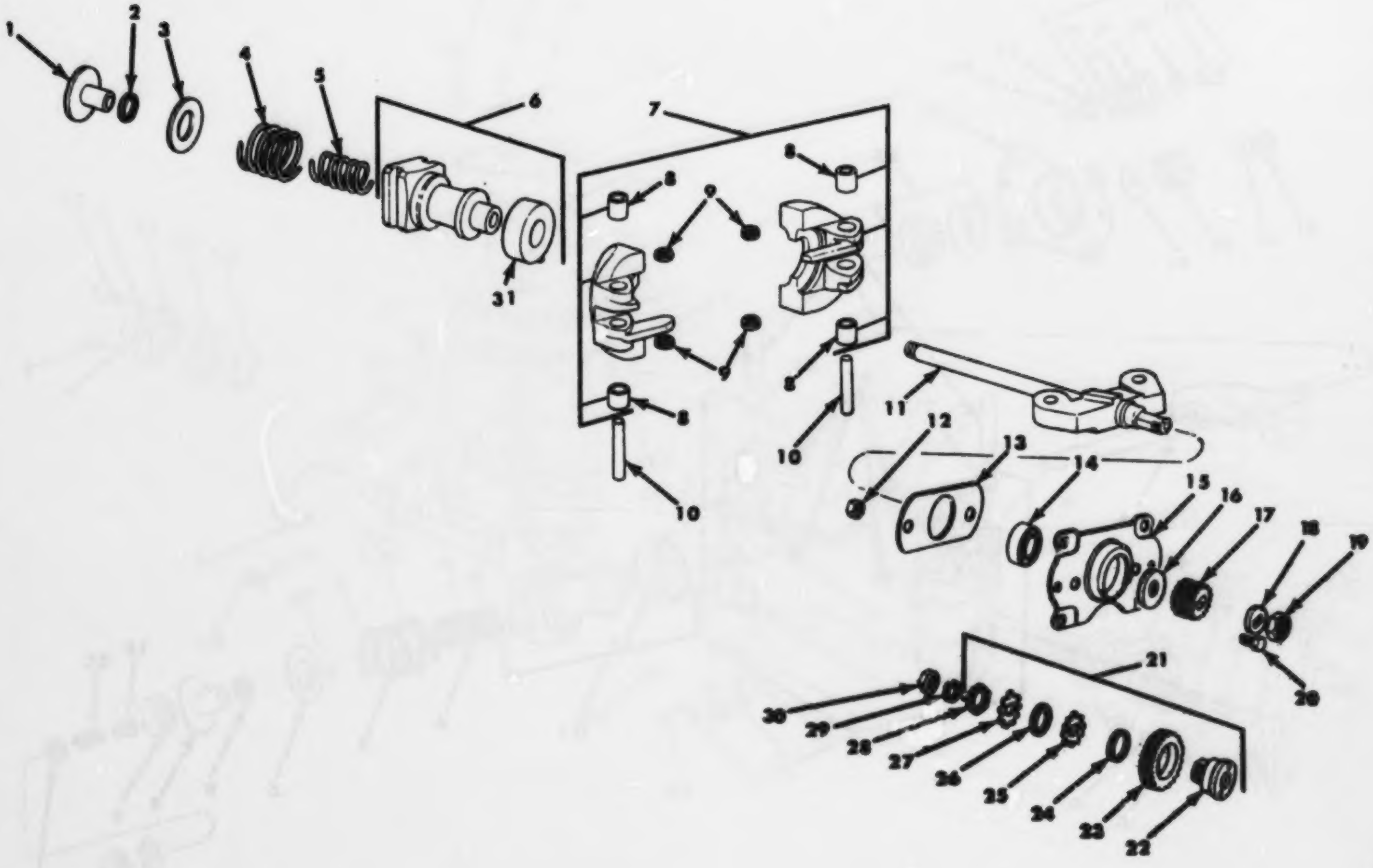
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Figure B-42. Governor, fuel injection, weight and shaft assembly—Governor Model 5749A—exploded view.

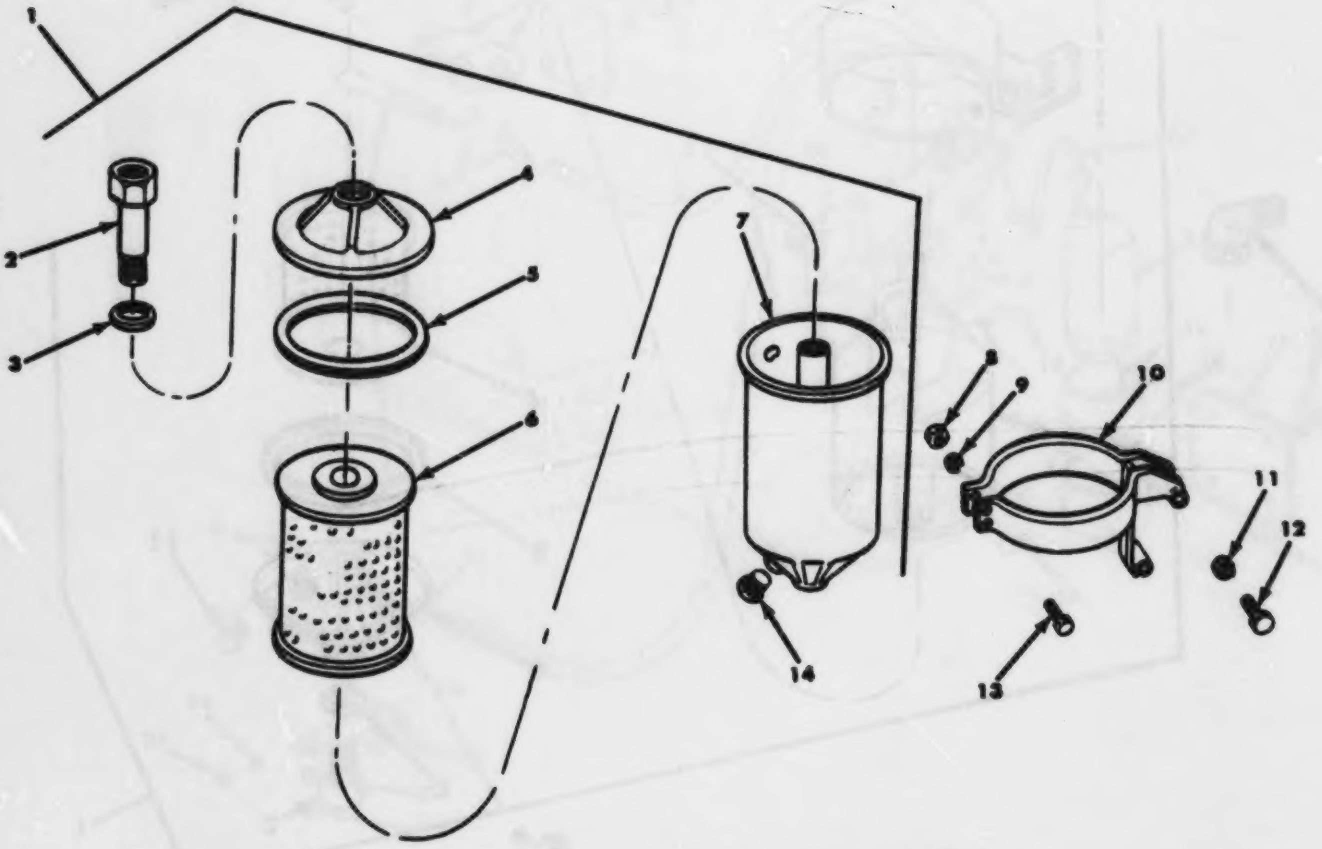
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Figure B-43. Fuel oil filter, secondary—exploded view.

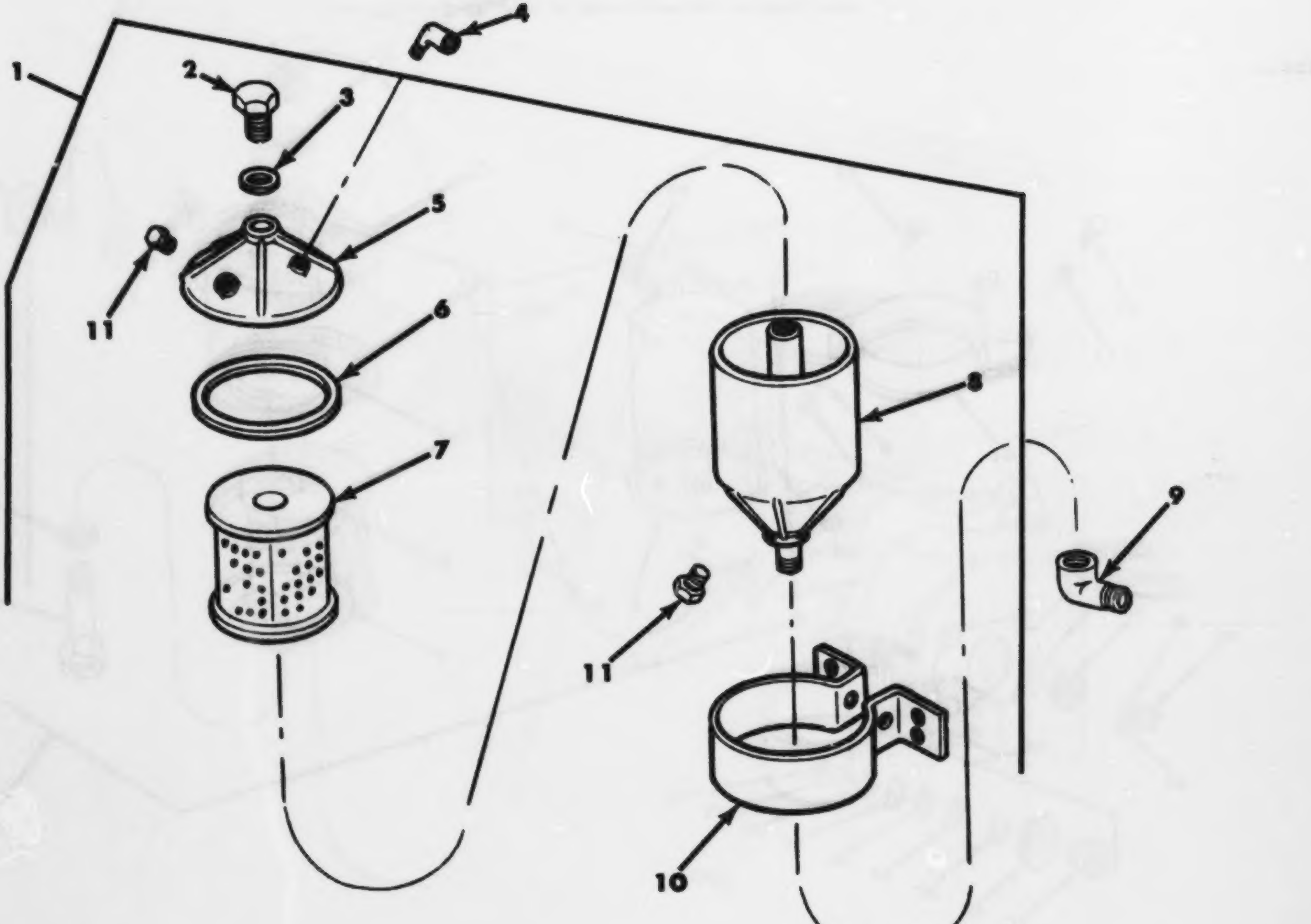
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Figure B-44. Fuel oil filter, primary—exploded view.

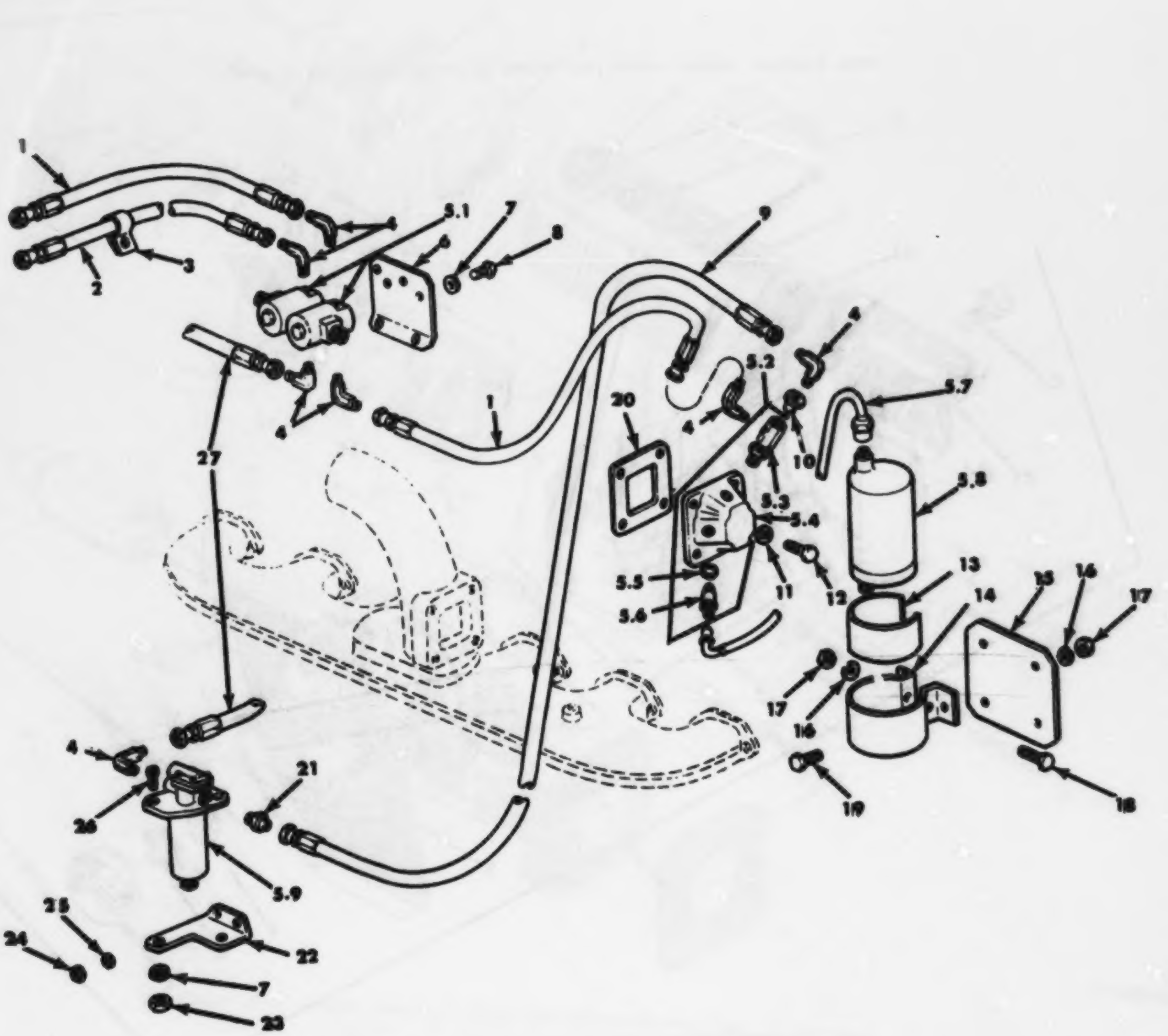
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Figure B-45. Intake manifold heater assembly—exploded view.

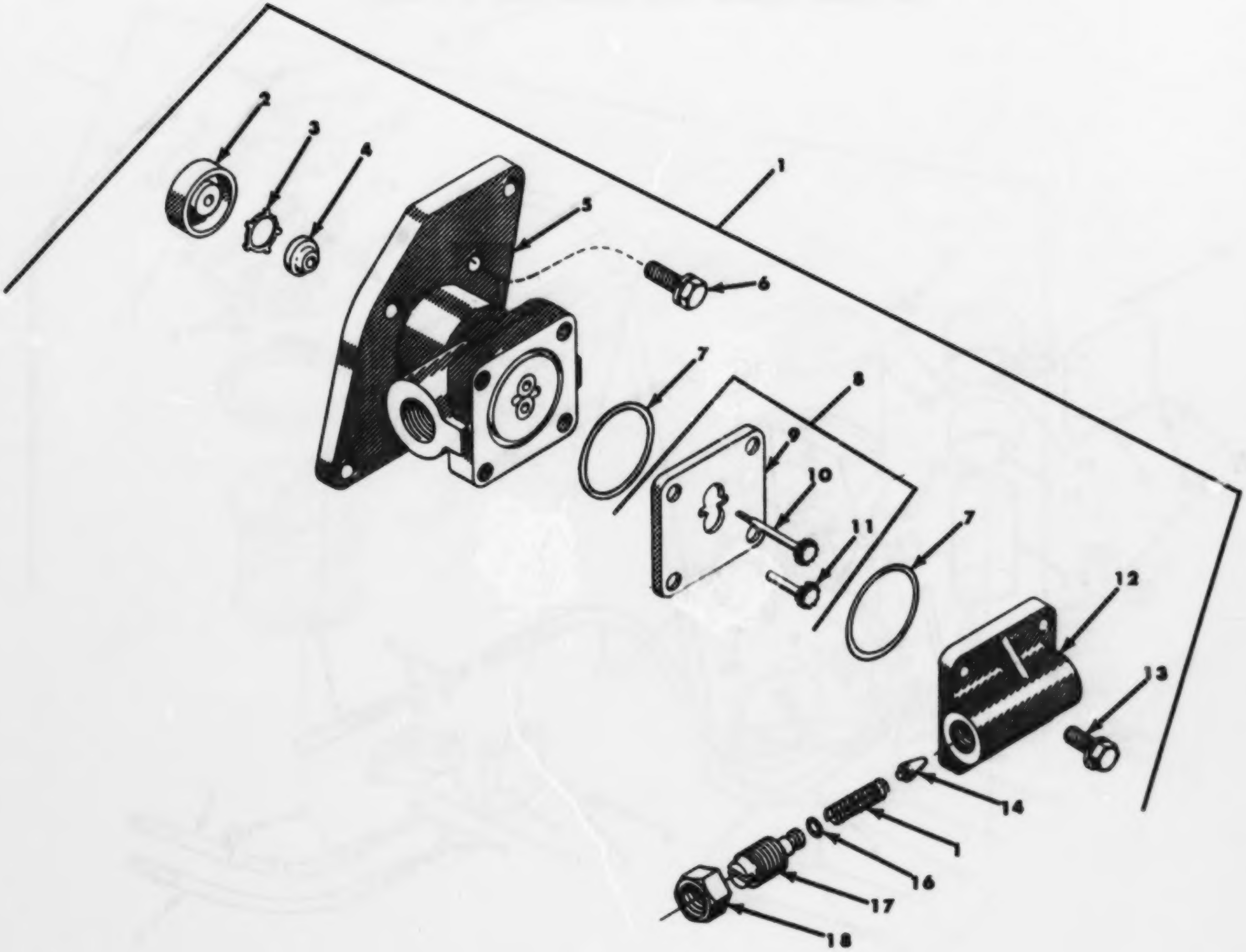
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Figure B–46. Intake manifold heater fuel pump—partial exploded view.

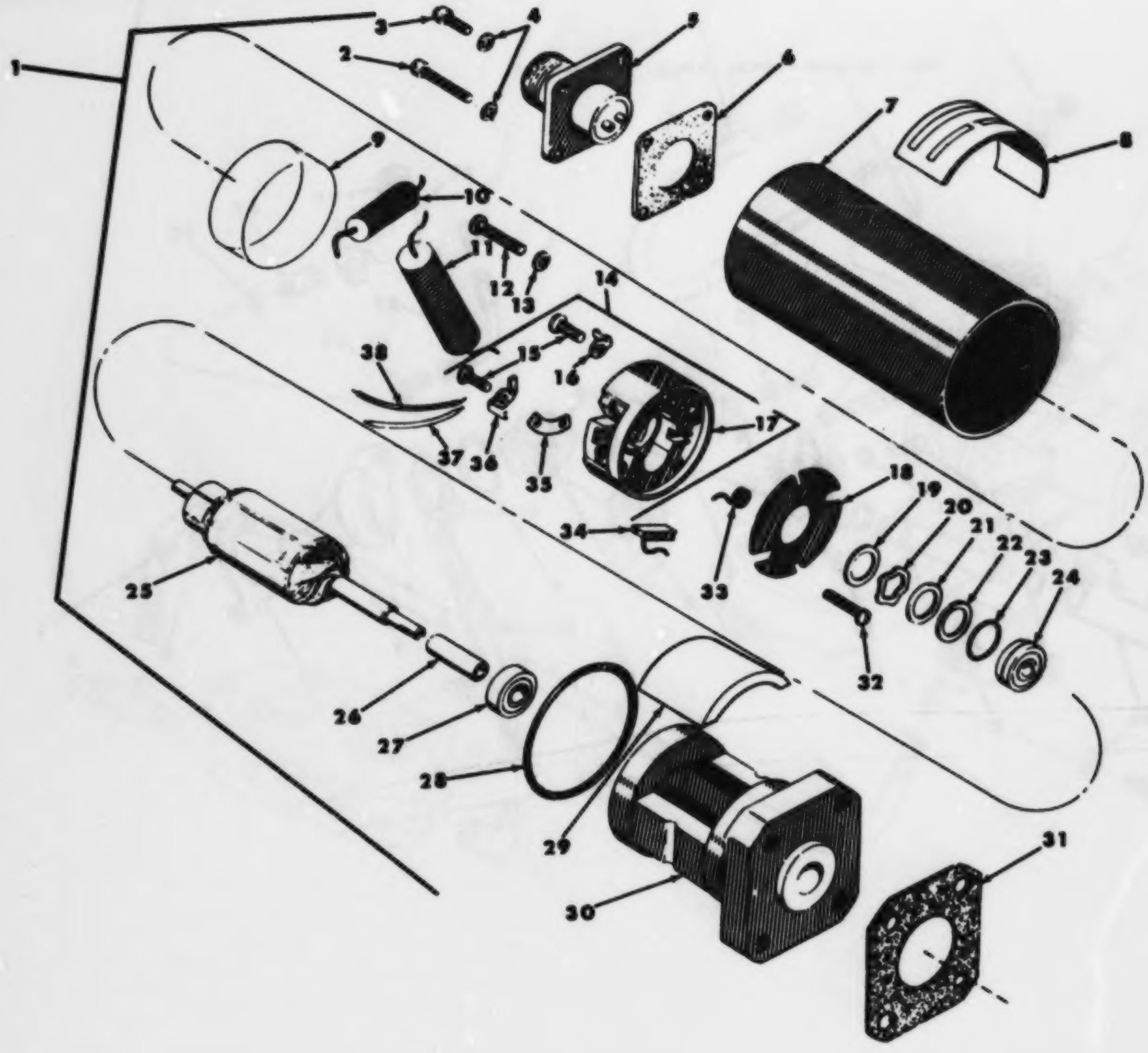
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Figure B-47. Intake manifold heater fuel pump—partial exploded view.

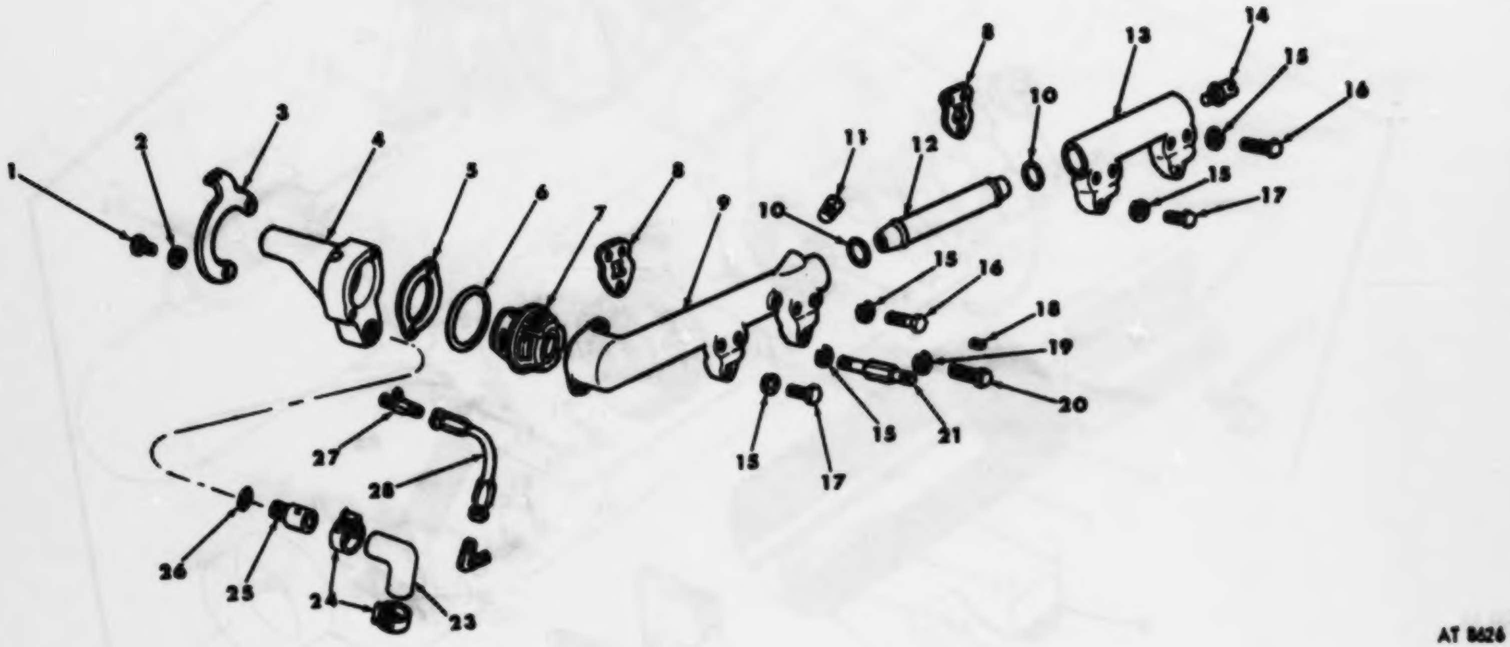
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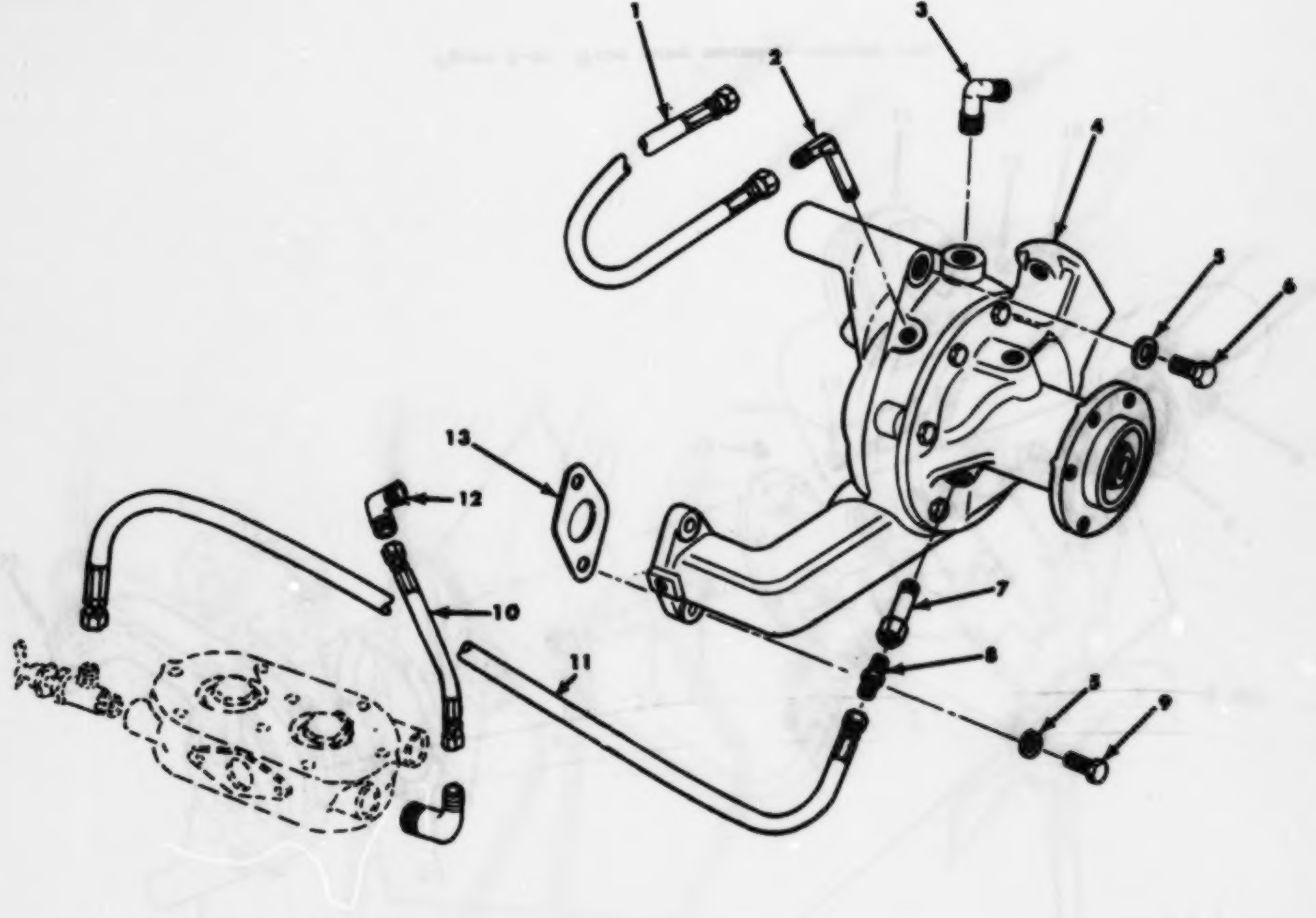
Figure B-48. Water header—exploded view.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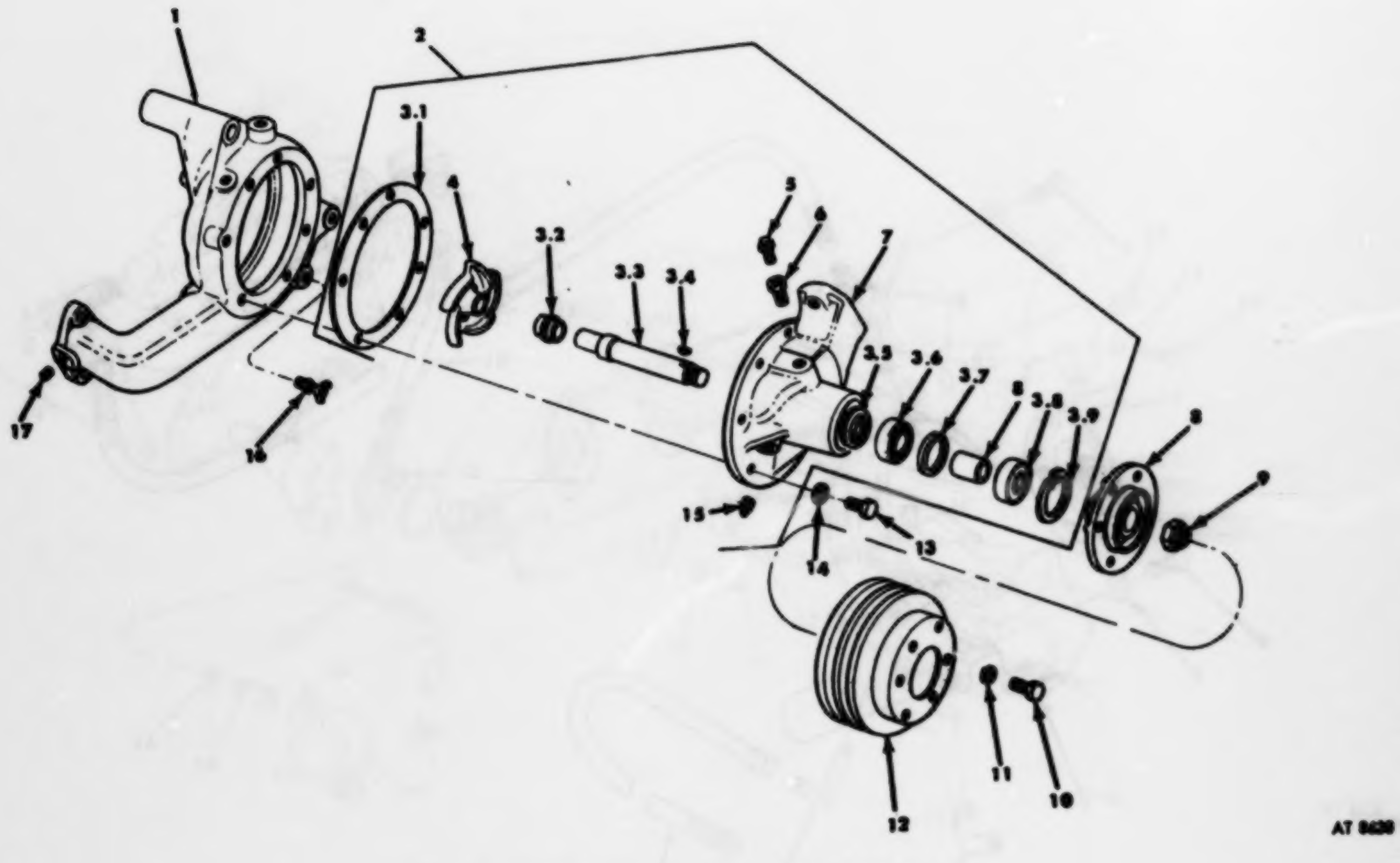
AT 8627

Figure B–49. Water pump assembly and related parts.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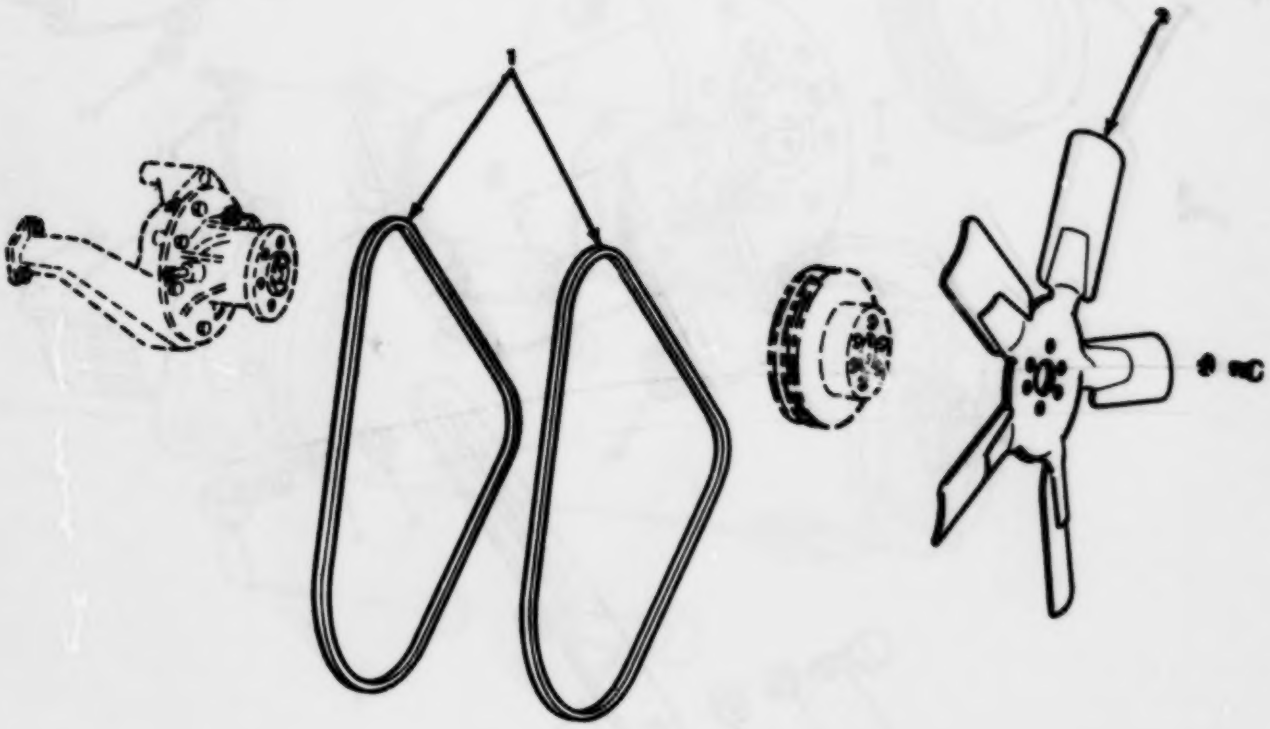
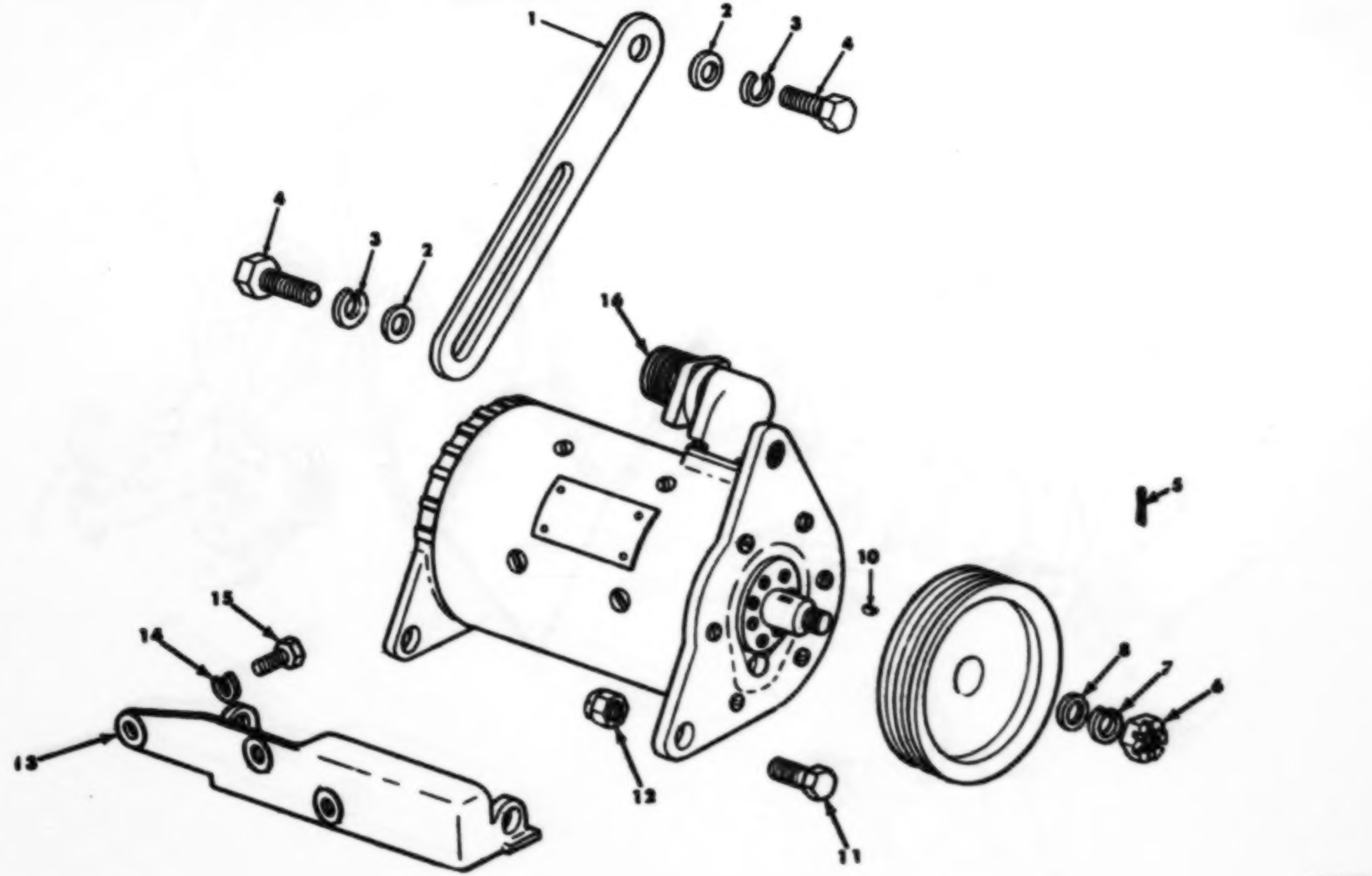
AT 8628

Figure B-60. Water pump assembly—exploded view.



AT 8629

Figure B–51. Fan assembly and related parts.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AT 8630

Figure B–52. Generator assembly and related parts.

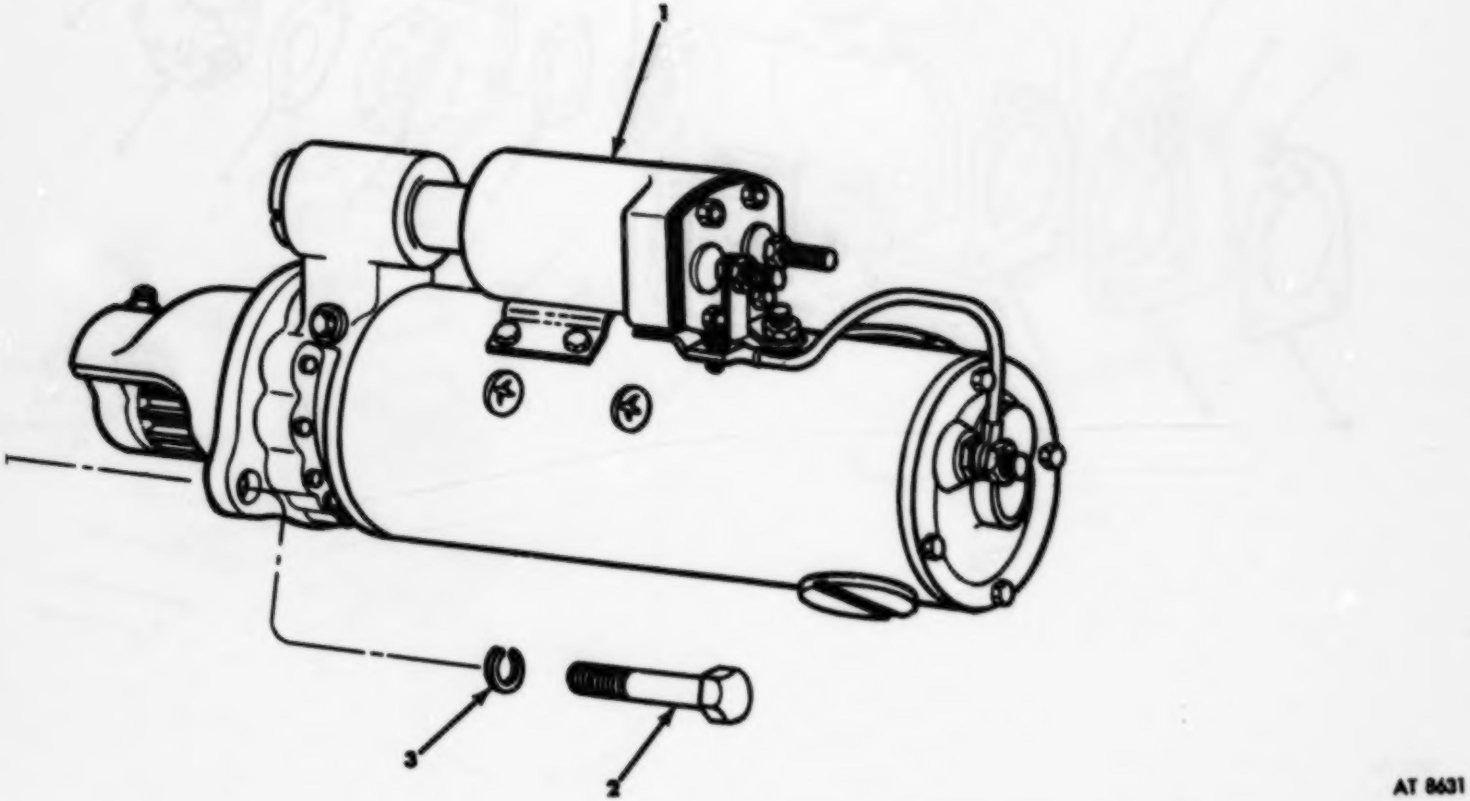
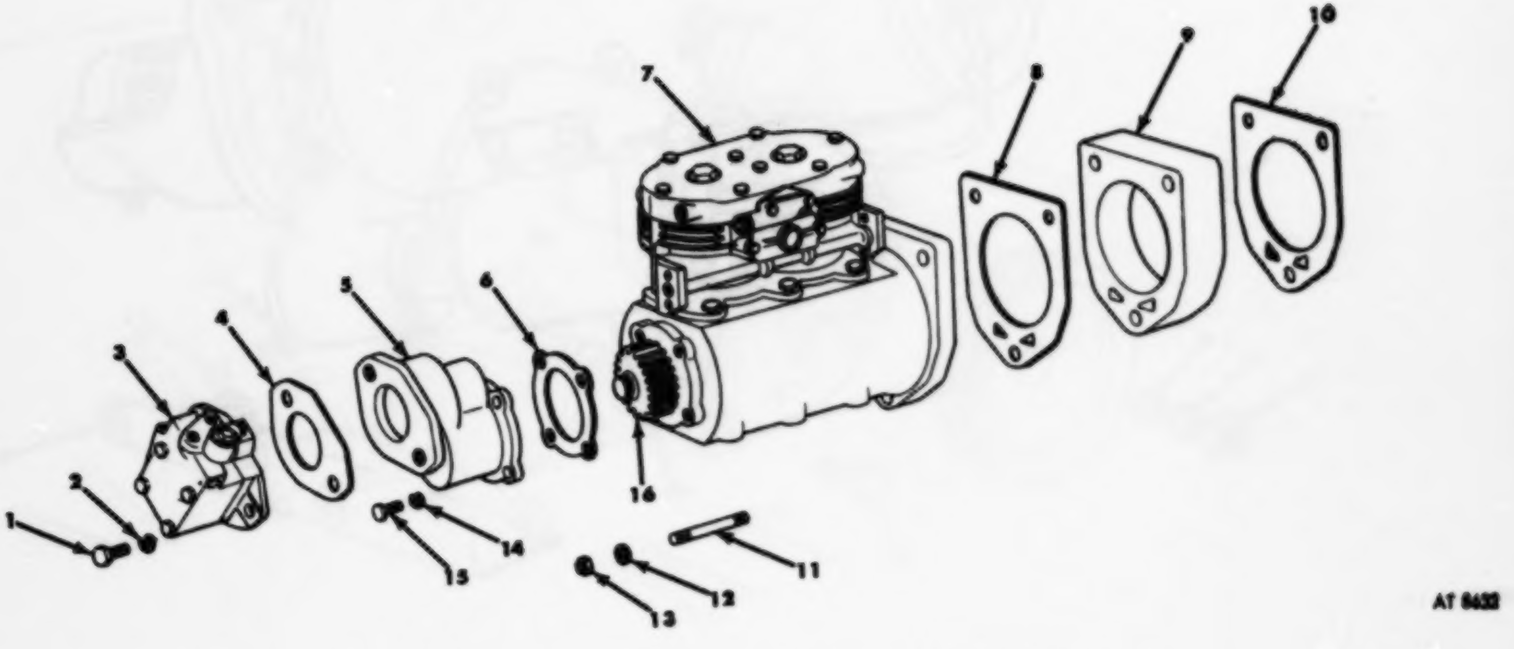


Figure B–88. Starter—solenoid assembly and related parts.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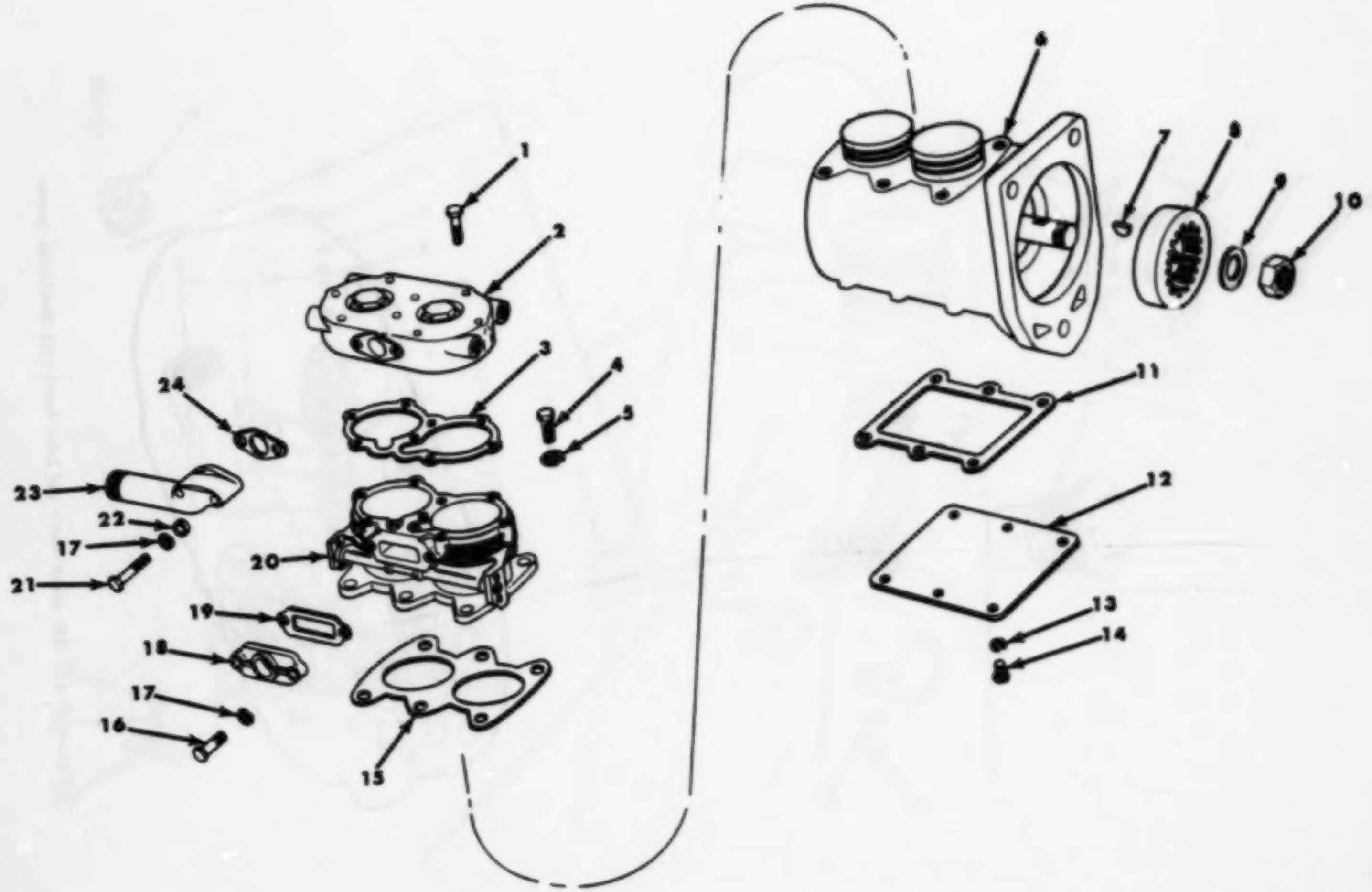
AT 8632

Figure B–54. Air compressor hydraulic steering pump and related parts.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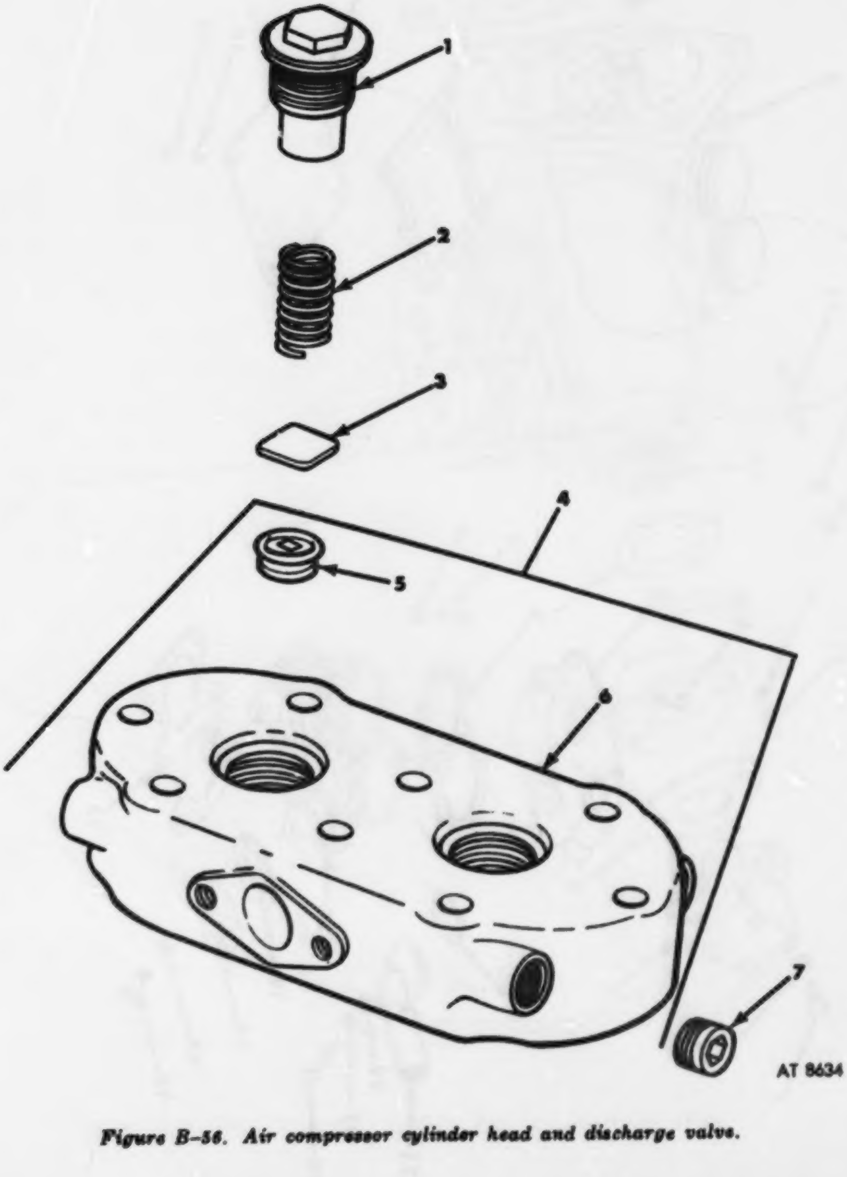
AT 8433

Figure B–55. Air compressor assembly—partial exploded view.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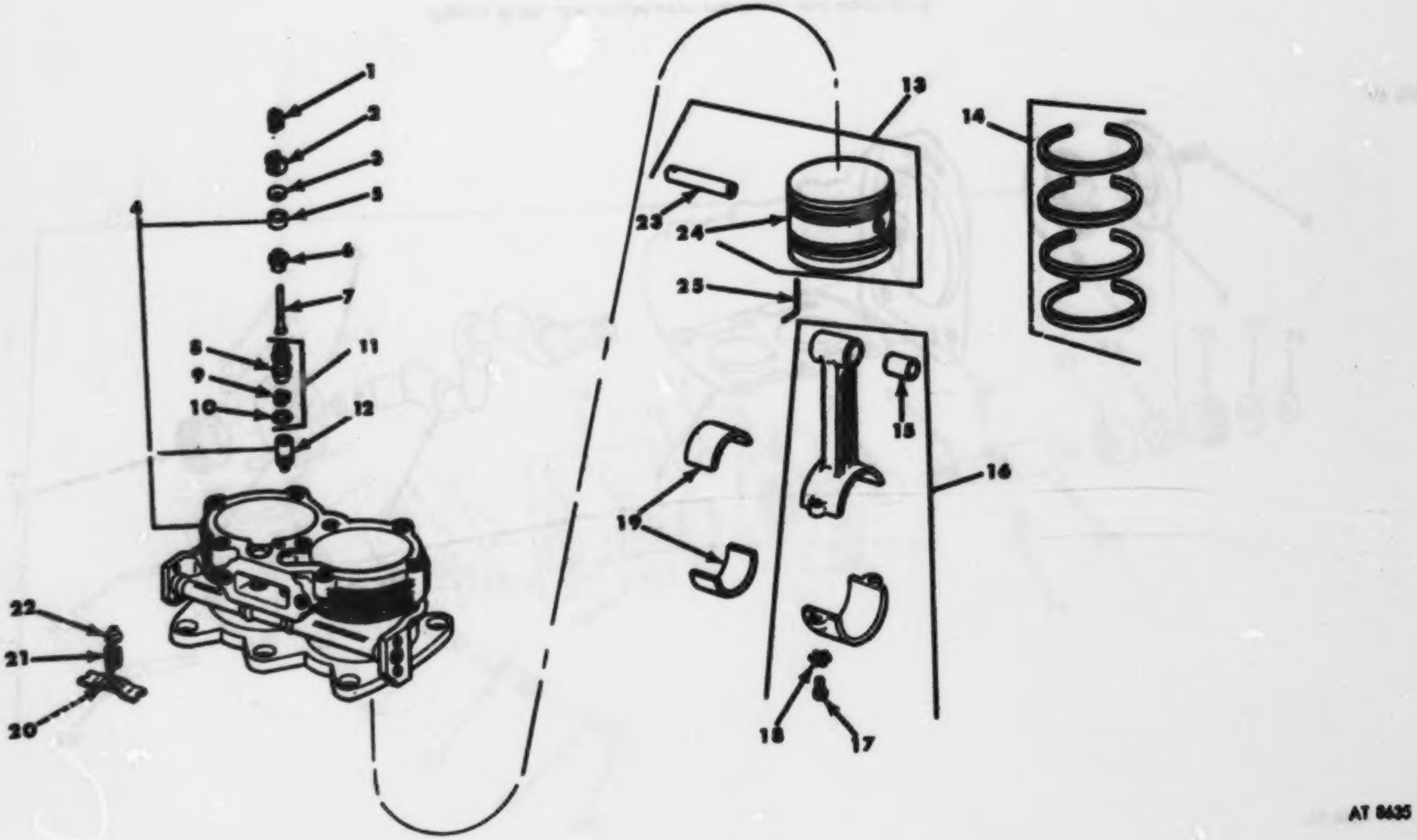
AT 8634

Figure B-56. Air compressor cylinder head and discharge valve.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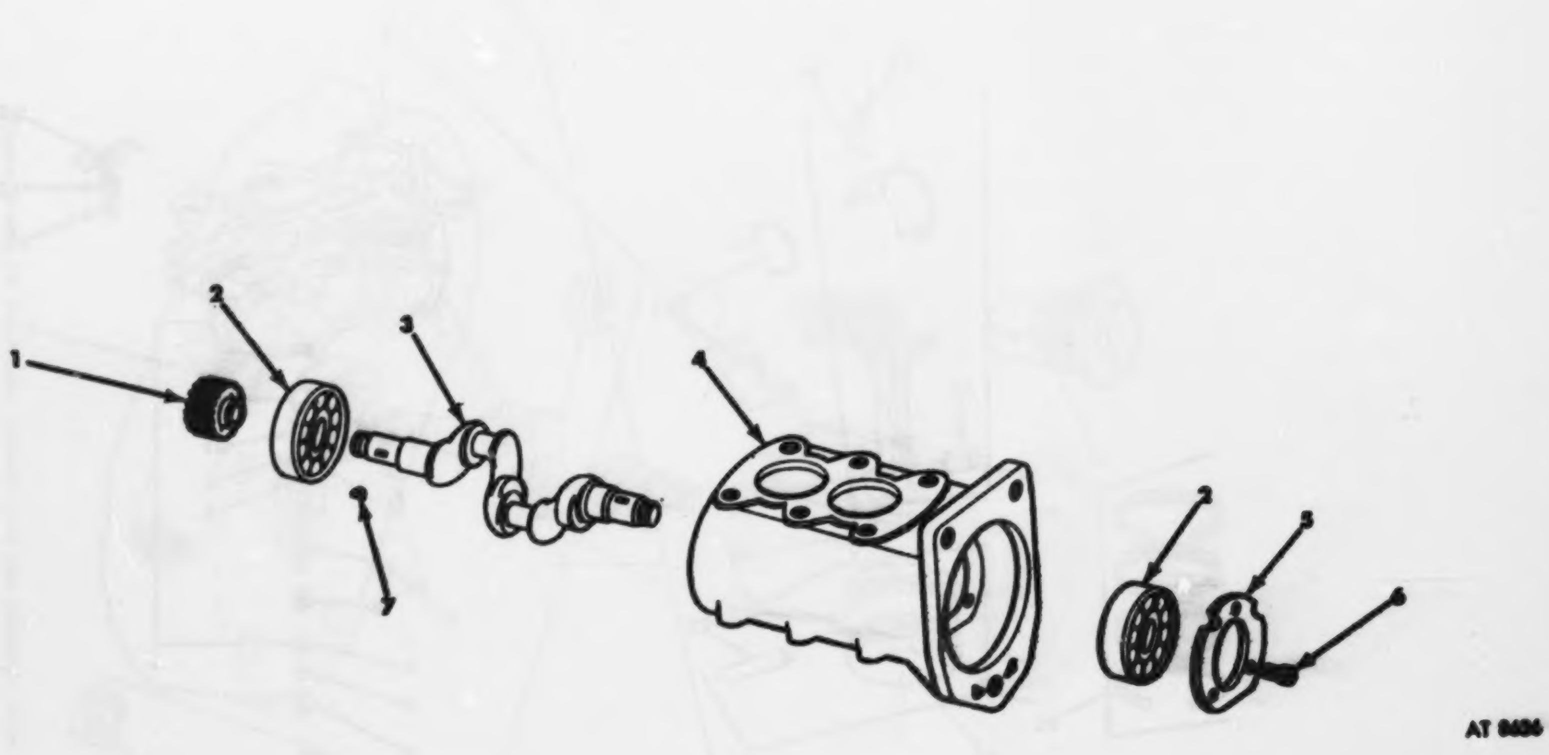
AT 8635

Figure B–57. Air compressor cylinder block, pistons and connecting rods.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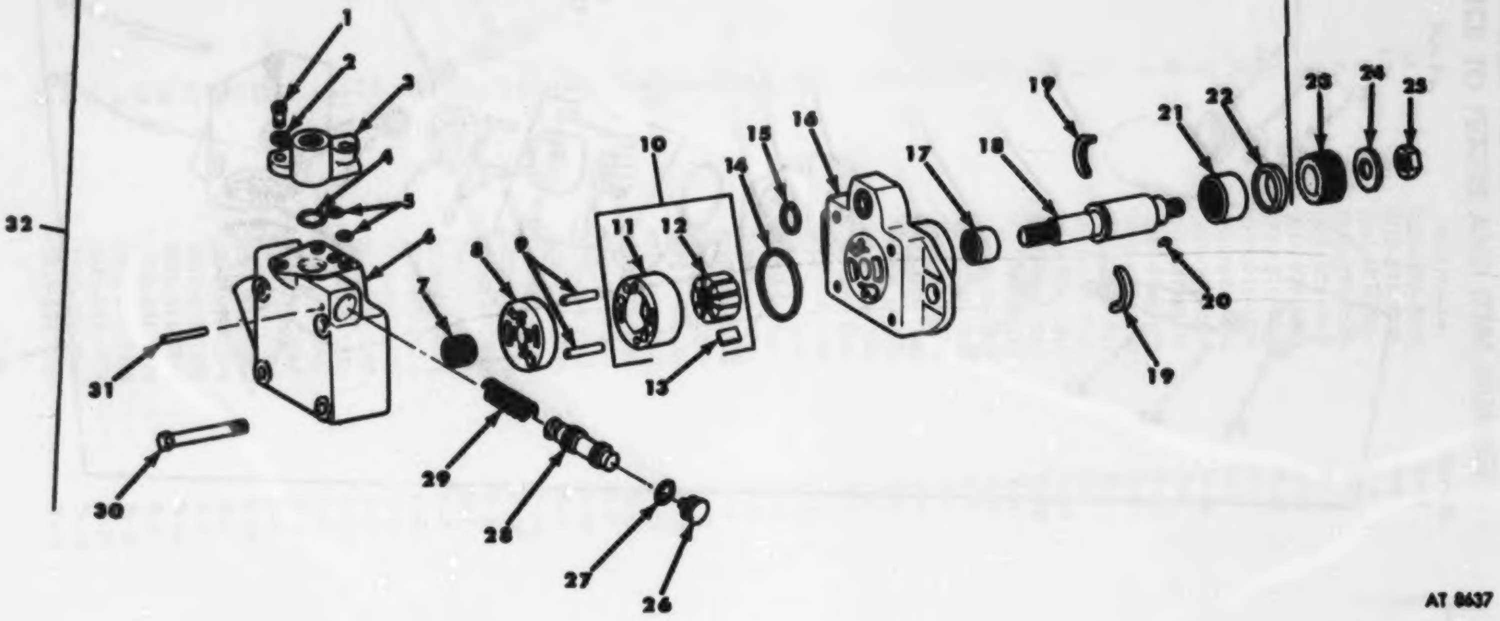
AT 8636

Figure B–48. Air compressor crankcase and crankshaft.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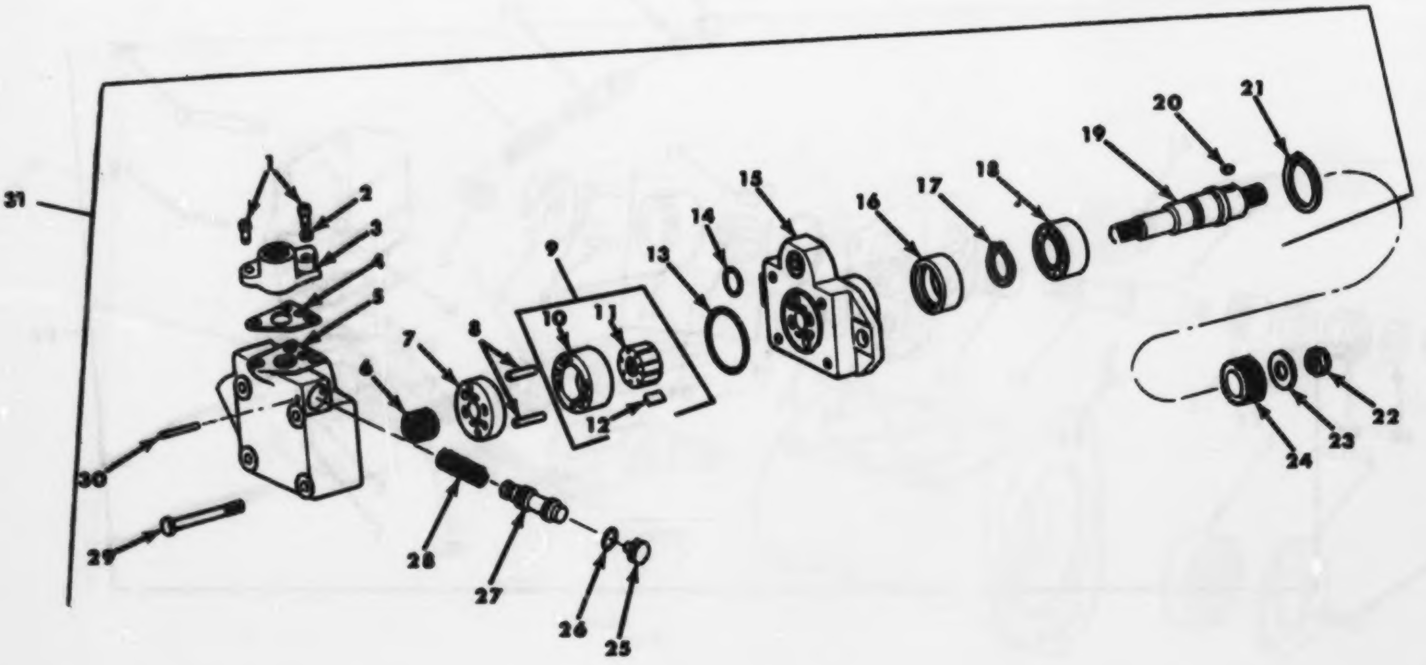
AT 8637

Figure B-59. Hydraulic steering pump—exploded view—Model VTM 27-60-45-10-MO-LI-10-S8.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AT 8638

Figure B-60. Hydraulic steering pump—exploded view—Model VTM 27-60-45-10-MO-LI-12-S8.

SECTION IV. INDEX—FEDERAL STOCK NUMBER CROSS-REFERENCE TO FIGURE AND ITEM NUMBER

Stock Number	Figure No.	Item No.
2518-974-7551	B-7	13
2518-974-7551	B-7	13
2520-097-3197	B-31	2
2520-097-4152	B-31	3
2520-506-4355		
2520-506-4355	B-32	
2520-692-5887	B-50	5
2520-692-5887	B-50	8
2520-737-6156		
2530-974-7456	B-54	7
2530-974-7495	B-59	32
2530-974-7562	B-6	6
2530-974-7562	B-7	
2530-974-7563	B-6	12
2530-974-7563	B-54	4
2530-974-7564	B-6	16
2530-974-7564	B-54	6
2530-974-7599	B-59	23
2530-974-7599	B-60	24
2805-695-6702	B-18	15
2815-087-2273	B-5	1.1
2815-087-5076	B-5	1
2815-650-3093	B-19	1
2815-733-2302	B-15	9
2815-890-2348	B-7	
2815-890-2362	B-6	
2815-974-7403	B-27	1
2815-974-7404	B-27	5
2815-974-7405	B-27	3
2815-974-7406	B-28	2
2815-974-7407	B-5	1
2815-974-7417	B-19	9
2815-974-7418	B-19	6
2815-974-7425	B-9	17
2815-974-7426	B-6	15
2815-974-7426	B-6	18
2815-974-7426	B-8	5
2815-974-7442	B-16	3
2815-974-7447	B-24	17
2815-974-7464	B-25	2
2815-974-7478	B-15	11
2815-974-7492	B-18	18
2815-974-7499	B-11	5
2815-974-7513	B-6	33
2815-974-7513	B-6	37
2815-974-7513	B-7	6
2815-974-7513	B-7	7
2815-974-7513	B-18	14
2815-974-7514	B-6	28
2815-974-7514	B-6	30
2815-974-7514	B-7	12
2815-974-7514	B-7	17
2815-974-7514	B-9	14
2815-974-7514	B-10	10
2815-974-7514	B-14	8
2815-974-7514	B-35	13
2815-974-7515	B-6	48
2815-974-7515	B-6	50

Stock Number	Figure No.	Item No.
2815-974-7515	B-17	9
2815-974-7516	B-6	19
2815-974-7516	B-6	21
2815-974-7516	B-14	6
2815-974-7519	B-20	14
2815-974-7523	B-18	6
2815-974-7535	B-13	3
2815-974-7536	B-6	2
2815-974-7536	B-6	2
2815-974-7536	B-20	4
2815-974-7539	B-6	48
2815-974-7539	B-17	1
2815-974-7540	B-9	19
2815-974-7541	B-6	1
2815-974-7541	B-7	4
2815-974-7541	B-16	11
2815-974-7541	B-16	11
2815-974-7542	B-6	30
2815-974-7542	B-6	49
2815-974-7542	B-7	2
2815-974-7542	B-7	10
2815-974-7542	B-27	6
2815-974-7550	B-6	42
2815-974-7550	B-6	47
2815-974-7550	B-7	14
2815-974-7550	B-7	16
2815-974-7550	B-28	1
2815-974-7551	B-6	31
2815-974-7551	B-6	48
2518-974-7551	B-7	15
2815-974-7551	B-27	4
2815-974-7552	B-18	1
2815-974-7553	B-19	4
2815-974-7554	B-19	3
2815-974-7555	B-6	5
2815-974-7555	B-24	1
2815-974-7557	B-6	7
2815-974-7557	B-23	25
2815-974-7558	B-20	7
2815-974-7561	B-6	35
2815-974-7561	B-6	38
2815-974-7561	B-7	11
2815-974-7561	B-21	5
2815-974-7568	B-6	34
2815-974-7568	B-6	38
2815-974-7568	B-17	3
2815-974-7569	B-6	
2815-974-7569	B-6	36
2815-974-7569	B-6	49
2815-974-7569	B-35	7
2815-974-7571	B-6	29
2815-974-7571	B-6	31
2815-974-7571	B-16	13
2815-974-7573	B-9	16
2815-974-7578	B-15	11
2815-974-7579	B-15	11
2815-974-7592	B-12	1
2815-974-7593	B-12	1

Stock Number	*Figure No.*	*Item No.*
2815-974-7594	B-12	1
2815-974-7596	B-13	6
2815-974-7597	B-26	5
2815-974-7601		
2815-974-7601	B-26	4
2815-974-7602		
2815-974-7602	B-20	
2815-974-7603	B-29	2
2815-974-7615	B-19	5
2815-974-7616	B-12	2
2815-974-7617	B-12	2
2815-974-7619	B-18	17
2815-974-7620	B-19	2
2815-974-7621	B-9	7
2815-980-7092	B-5	1.1
2910-890-2507	B-40	13
2910-974-7410	B-43	5
2910-974-7412	B-36	27
2910-974-7415	B-37	8
2910-974-7428	B-34	45
2910-974-7429	B-34	44
2910-974-7430	B-34	42
2910-974-7431	B-34	41
2910-974-7432	B-34	40
2910-974-7433	B-34	39
2910-974-7434	B-34	3
2910-974-7435	B-34	5
2910-974-7436	B-34	43
2910-974-7445	B-43	6
2910-974-7468	B-38	25
2910-974-7470	B-45	30
2910-974-7470	B-45	5.9
2910-974-7486	B-34	27
2910-974-7487	B-34	51
2910-974-7521	B-29	19
2910-974-7532	B-34	7
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2910-974-7567	B-6	14
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2910-974-7570	B-33	13
2910-974-7581	B-45	10
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2910-974-7608	B-37	12
2910-974-7609	B-34	54
2910-974-7610	B-37	10
2910-974-7611	B-34	48
2910-974-7613	B-35	.6
2910-974-7614	B-33	15
2910-974-7623	B-34	37
2910-974-9676	B-45	5.3
2920-226-6545	B-53	1

Stock Number	*Figure No.*	*Item No.*
2920-267-9987	B-53	1
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2920-733-0779	B-6	32
2920-733-0779	B-6	46
2920-733-0779	B-6	46
2920-733-0779	B-30	8
2920-903-9534	B-52	16
2920-923-8911	B-53	1
2920-974-7453	B-45	1
2920-974-7453	B-45	2
2920-974-7453	B-45	5.6
2920-974-7455	B-52	9
2930-974-7448	B-51	2
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2930-974-7465	B-50	
2930-974-7465	B-50	3
2930-974-7466	B-50	2
2930-974-7484	B-48	28
2930-974-7485	B-49	1
2930-974-7488	B-49	11
2930-974-7497	B-50	4
2930-974-7497	B-50	3
2930-974-7515	B-6	23
2930-974-7515	B-48	10
2930-974-7517	B-6	25
2930-974-7525	B-48	23
2930-974-7542	B-7	12
2930-974-7549	B-6	32
2930-974-7549	B-6	36
2930-974-7549	B-22	6
2930-974-7572	B-6	43
2930-974-7572	B-6	46
2930-974-7572	B-7	15
2930-974-7572	B-48	8
2990-974-7572	B-48	8
2990-974-7402	B-45	5.8
2990-974-7402	B-45	21
2990-974-7443	B-45	5
2990-974-7480	B-45	9
2990-974-7481	B-45	3
2990-974-7481	B-45	27
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2990-974-7483	B-45	36
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2990-974-7548	B-6	29
2990-974-7548	B-7	5
2990-974-7548	B-7	8
2990-974-7548	B-39	29
2990-974-7562	B-39	23
2990-974-7565	B-6	40
2990-974-7565	B-45	17
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2990-974-7583	B-39	6
2990-974-7605	B-45	5.1

Stock Number	Figure No.	Item No.
2990-974-7605	B-45	6
3030-974-7628	B-51	1
3110-112-5774	B-32	19
3110-144-8511	B-29	18
3110-144-8687	B-31	1
3110-732-6374	B-30	13
3110-732-6375	B-30	15
4730-142-2178	B-34	6
4730-769-7737	B-50	16
4730-769-7737	B-50	24
4730-974-7449	B-10	9
4730-974-7451	B-24	13
4730-974-7452	B-10	5
4730-974-7526	B-34	8
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4730-974-7586	B-34	25
4730-974-7588	B-45	21
4730-974-7589	B-48	27
4730-974-7625	B-39	15
4730-981-2767	2-4	4
4820-769-7694	B-10	27
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4910-977-7403	2-3	2
4910-977-7405	2-3	1
4910-977-7407	2-4	3
4910-977-7412	2-7	2
4910-977-7416	2-9	1
4910-977-7417	2-1	1
4910-977-7419	2-8	3
4910-977-8967	2-3	5
4910-977-8971	2-9	2
4910-981-2768	2-8	5
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4910-981-2771	2-7	1
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4910-996-7257	2-1	3
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5110-977-7411	2-5	8
5120-321-6517	2-9	5
5120-321-6582	2-4	1
5120-422-8967	2-5	7
5120-793-5045	2-9	4
5120-862-9371	2-8	2
5120-937-7834	2-9	3
5120-977-7404	2-3	4
5120-977-7406	2-4	2
5120-977-7409	2-4	5
5120-977-7418	2-3	[illegible]
5305-018-0149	B-18	7
5305-539-8117	B-11	8
5305-639-8118	B-35	16
5305-682-5459	B-8	1
5305-699-6637	B-18	8
5305-699-6637	B-18	9
5305-974-7459	B-29	4
5305-974-7459	B-30	9
5305-974-7461	B-29	7
5305-974-7472	B-29	3
5305-974-7497	B-17	16
5305-974-7498	B-15	12

Stock Number	Figure No.	Item No.
5305-974-7500	B-18	19
5305-974-7501	B-16	1
5305-974-7502	B-36	31
5305-974-7503	B-33	2
5305-974-7506	B-18	9
5305-974-7508	B-29	20
5305-974-7509	B-11	7
5306-974-7401	B-12	11
5307-974-7422	B-9	20
5307-974-7577	B-9	11
5310-010-3325	B-53	3
5310-285-5636	B-52	6
5310-285-5636	B-52	6
5310-333-7450	B-10	6
5310-333-7450	B-24	14
5310-655-9497	B-52	6
5310-732-9135	B-9	5
5310-733-0601	B-13	2
5310-809-5998	B-52	8
5310-974-7416	B-29	11
5310-974-7419	B-9	4
5310-974-7420	B-34	2
5310-974-7421	B-29	21
5310-974-7427	B-34	38
5310-974-7437	B-17	13
5310-974-7438	B-9	6
5310-974-7441	B-18	2
5310-974-7444	B-27	8
5310-974-7478	B-29	15
5310-974-7496	B-17	14
5310-974-7559	B-33	7
5310-974-7616	B-20	5
5310-974-7616	B-30	18
5310-974-7622	B-29	22
5310-974-9677	B-6	45
5310-974-9677	B-7	4
5310-974-9677	B-7	9
5310-974-9677	B-16	2
5315-010-3905	B-52	10
5315-013-7185	B-13	1
5315-597-7754	B-52	5
5315-693-0048	B-20	6
5315-694-8367	B-20	13
5315-694-8367	B-29	1
5315-695-9839	B-10	7
5315-699-8367	B-30	12
5315-974-7423	B-35	39
5315-974-7463	B-13	5
5315-974-7504	B-29	9
5315-974-7505	B-11	2
5315-974-7507	B-12	9
5330-298-0091	B-45	5.5
5330-974-7537	B-6	44
5330-974-7537	B-6	51
5330-974-7537	B-54	8
5330-974-7543	B-6	3
5330-974-7543	B-10	4
5330-974-7543	B-49	13
5340-974-7474	B-15	8
6620-974-7595	B-48	7
8115-973-2285	B-5	1.2

SECTION V. INDEX—PART NUMBER
CROSS-REFERENCE TO FIGURE AND ITEM NUMBER

Part Number	Figure No.	Item No.
25140–AZ1D632–2	B–47	13
25140–7A2326	B–47	25
25140–11AG55	B–47	14
25140–1D1059	B–47	2
25140–4D156S	B–47	7
25140–9D947	B–47	4
25140–9D1345	B–47	6
25140–9D1347	B–47	28
25140–9D1406	B–47	18
25140–9D1425	B–47	23
25140–10D612	B–47	20
25140–10D691	B–47	33
25140–15D023A056	B–47	27
25140–15D1009	B–47	24
25140–17D1992	B–47	8
25140–19D1154	B–47	26
25140–21D635	B–47	19
25140–21D636	B–47	21
25140–21D637	B–47	22
25140–29D538–2	B–47	29
25140–32D617	B–47	36
25140–32D753	B–47	16
25140–33D1075	B–47	17
25140–33D1076	B–47	30
25140–40D944–A3–1/2	B–47	37
25140–40D944–B3–1/2	B–47	38
25140–40D1275	B–47	34
25140–40D1473	B–47	10
25140–40D1511	B–47	11
25140–40D1545	B–47	35
25140–RA16856	B–47	31
25140–RD16701–1	B–47	1
25140–901348	B–47	9
31007–101001R11		
31007–165591R91		
31007–165591R91	B–31	3
51663–RA16716	B–46	15
51663–RA17126	B–46	13
51663–RA17127	B–46	6
51663–RB16232	B–46	8
51663–RB16707	B–46	17
51663–RB16708–1	B–46	10
51663–RB16851	B–46	9
51663–RB17708	B–46	14
51663–RD16713–1	B–46	11
51663–RD16847	B–46	12
51663–RG16705–3	B–46	1
51663–RG16845–1	B–46	5
71724–012–0406–008–5BW	B–46	4
71724–015–075–8BW	B–46	2
76040–1AB1805	B–16	4
76040–AX1035	B–54	11
76040–1AX8	B–45	19
76040–1AX30	B–45	18
76040–1AX32	B–35	4
76040–1AX34	B–39	31
76040–1AX67	B–9	2
76049–1AX110	B–24	7

Part Number	Figure No.	Item No.
76040–1AX123	B–35	40
76040–1AX147	B–34	13
76040–1AX147	B–43	13
76040–1AX304	B–9	2
76040–1AX374	B–21	22
76040–1AX374	B–35	42
76040–2AX25	B–25	22
76040–3AX629	B–39	42
76040–3AX758	B–25	30
76040–3AX1112	B–29	4
76040–3AX1112	B–30	9
76040–3AX1805	B–29	7
76040–3AX1640	B–17	11
76040–3AX1641	B–17	8
76040–4AX1	B–22	24
76040–4AX1	B–39	33
76040–4AX1	B–48	17
76040–4AX2	B–30	1
76040–4AX5	B–22	1
76040–4AX5	B–54	15
76040–4AX5	B–55	16
76040–4AX6	B–14	13
76040–4AX6	B–20	1
76040–4AX16	B–35	16
76040–4AX16	B–54	1
76040–4AX22	B–34	23
76040–4AX22	B–35	32
76040–4AX24	B–10	1
76040–4AX24	B–24	16
76040–4AX25	B–49	9
76040–4AX27	B–28	5
76040–4AX27	B–35	22
76040–4AX34	B–34	14
76040–4AX43	B–53	2
76040–4AX45	B–55	21
76040–4AX56	B–43	12
76040–4AX58	B–22	25
76040–4AX58	B–24	18
76040–4AX58	B–35	19
76040–4AX58	B–35	19
76040–4AX58	B–50	10
76040–4AX66	B–52	15
76040–4AX76	B–10	25
76040–4AX76	B–22	18
76040–4AX76	B–46	12
76040–4AX76	B–45	19
76040–4AX76	B–50	13
76040–4AX99	B–24	10
76040–4AX124	B–48	1
76040–4AX128	B–21	1
76040–4AX133	B–49	6
76040–4AX140	B–18	7
76040–4AX167	B–48	20
76040–4AX169	B–48	16
76040–4AX262	B–18	9
76040–4AX280	B–22	20
76040–4AX289	B–23	16
76040–6AX96	B–25	24

Part Number	Figure No.	Item No.
76040-6AX278	B-25	5
76040-6AX401	B-35	27
76040-6AX421	B-18	8
76040-6AX424	B-52	4
76040-6AX441	B-25	31
76040-6AX449	B-25	27
76040-6AX450	B-25	11
76040-6AX489	B-24	20
76040-6AX679	B-35	12
76040-6AX696	B-8	1
76040-6AX722	B-35	24
76040-6AX819	B-11	8
76040-6AX829	B-35	9
76040-6AX847	B-14	15
76040-6AX847	B-16	16
76040-6AX847	B-29	14
76040-6AX847	B-39	10
76040-6AX862	B-17	15
76040-6AX874	B-17	6
76040-6AX847	B-39	10
76040-6AX1142	B-22	29
76040-6AX1146	B-25	16
76040-6AX1151	B-25	39
76040-6AX1163	B-26	15
76040-6AX1231	B-14	4
76040-9AX21	B-45	8
76040-9AX59	B-21	18
76040-9AX72	B-45	26
76040-13AX520	B-16	17
76040-16AX806	B-39	3
76040-16AX809	B-22	8
76040-17AX42	B-9	20
76040-17AX84	B-9	20
76040-17AX89	B-27	9
76040-18AX1035	B-54	11
76040-18AX1074	B-48	21
76040-19AX1	B-25	19
76040-20AX1	B-21	19
76040-20AX1	B-22	7
76040-20AX1	B-35	1
76040-20AX1	B-43	8
76040-20AX1	B-45	17
76040-20AX2	B-24	2
76040-20AX2	B-35	38
76040-20AX3	B-34	38
76040-20AX4	B-45	24
76040-20AX21	B-30	24
76040-21AX45	B-13	2
76040-21AX75	B-26	1
76040-21AX838	B-17	13
76040-21AX441	B-34	21
76040-21AX499	B-9	6
76040-21AX638	B-59	25
76040-21AX638	B-60	22
76040-21AX639	B-50	9
76040-21AX673	B-52	12
76040-21AX691	B-39	1
76040-21AX692	B-39	38
76040-21AX735	B-54	13
76040-21AX750	B-18	2
76040-22AX20	B-39	24
76040-22AX21	B-35	25
76040-23AX395	B-27	8
76040-23AX395	B-39	37
76040-29AX1	B-21	15
76040-29AX1	B-25	20
76040-29AX3	B-26	6
76040-29AX4	B-26	3
76040-29AX10	B-35	33
76040-29AX11	B-29	13
76040-29AX12	B-29	13
76040-29AX12	B-13	1
76040-31AX13	B-30	7
76040-31AX119	B-14	7
76040-31AX268	B-10	7
76040-31AX491	B-13	5
76040-31AX532	B-26	11
76040-31AX542	B-39	40
76040-32AX65	B-20	6
76040-32AX65	B-30	16
76040-33AX62	B-35	29
76040-35AX1197	B-29	3
76040-35AX1278	B-35	23
76040-36AX1	B-14	12
76040-36AX1	B-20	2
76040-36AX1	B-35	2
76040-36AX1	B-43	9
76040-36AX1	B-45	16
76040-36AX1	B-55	13
76040-36AX2	B-24	3
76040-36AX3	B-18	11
76040-36AX3	B-22	21
76040-36AX3	B-24	19
76040-36AX3	B-29	15
76040-36AX3	B-34	15
76040-36AX3	B-35	18
76040-36AX3	B-39	9
76040-36AX3	B-50	11
76040-36AX3	B-52	3
76040-36AX3	B-54	2
76040-36AX3	B-55	4
76040-36AX4	B-28	4
76040-36AX4	B-35	21
76040-36AX4	B-45	25
76040-36AX5	B-8	2
76040-36AX5	B-10	2
76040-36AX5	B-23	17
76040-36AX5	B-24	15
76040-36AX5	B-43	11
76040-36AX5	B-49	5
76040-36AX5	B-52	14
76040-36AX6	B-9	3
76040-36AX7	B-9	3
76040-36AX7	B-35	15
76040-36AX22	B-10	24
76040-36AX22	B-22	17
76040-36AX22	B-24	8
76040-36AX22	B-35	37
76040-36AX22	B-39	25
76040-36AX22	B-54	14
76040-36AX22	B-55	17
76040-36AX76	B-45	7

Part Number	Figure No.	Item No.
76040–36AX76	B–45	8
76040–36AX1221	B–50	9
76040–37AX1	B–14	12
76040–37AX1	B–21	2
76040–37AX1	B–22	2
76040–37AX1	B–35	36
76040–37AX1	B–45	11
76040–37AX1	B–50	14
76040–37AX2	B–48	19
76040–37AX5	B–30	2
76040–37AX7	B–14	16
76040–37AX7	B–16	15
76040–37AX7	B–17	5
76040–37AX7	B–39	2
76040–37AX7	B–48	15
76040–37AX9	B–22	31
76040–37AX9	B–39	34
76040–37AX14	B–10	19
76040–37AX26	B–59	24
76040–37AX26	B–60	23
76040–37AX68	B–55	22
76040–37AX83	B–54	12
76040–37AX138	B–52	2
76040–37AX166	B–18	10
76040–37AX166	B–35	11
76040–37AX256	B–27	7
76040–37AX256	B–48	2
76040–37AX265	B–39	36
76040–37AX345	B–21	16
76040–37AX419	B–18	5
76040–37AX420	B–10	21
76040–37AX421	B–17	12
76040–37AX441	B–29	6
76040–38AX38	B–23	23
76040–39AX1	B–23	19
76040–39AX23	B–10	6
76040–39AX23	B–24	14
76040–39AX25	B–17	14
76040–42AX28	B–50	3.4
76040–42AX167	B–30	17
76040–42AX214	B–20	13
76040–42AX214	B–29	1
76040–42AX214	B–30	12
76040–42AX274	B–25	1
76040–42AX336	B–30	20
76040–42AX360	B–26	2
76040–42AX550	B–11	2
76040–42AX618	B–29	9
76040–42AX620	B–12	9
76040–46AX313	B–29	12
76040–46AX314	B–29	18
76040–46AX451	B–50	3.6
76040–46AX452	B–50	3.8
76040–49AX61	2–4	4
76040–49AX155	B–9	15
76040–49AX155	B–10	11
76040–49AX155	B–35	14
76040–52AX4	B–39	19
76040–52AX5	B–24	12
76040–52AX6	B–21	10
76040–52AX7	B–34	4
76040–52AX13	B–22	12
76040–53AX6	B–45	23
76040–53AX6	B–45	22
76040–56AX107	B–6	3
76040–56AX107	B–10	4
76040–56AX107	B–49	13
76040–56AX255	B–6	16
76040–56AX255	B–25	23
76040–56AX262	B–6	9
76040–56AX262	B–6	12
76040–56AX262	B–10	22
76040–56AX326	B–6	41
76040–56AX326	B–7	9
76040–56AX326	B–16	2
76040–56AX326	B–21	20
76040–56AX356	B–6	25
76040–56AX356	B–7	5
76040–56AX356	B–39	7
76040–56AX357	B–6	18
76040–56AX357	B–6	27
76040–56AX357	B–7	8
76040–56AX357	B–22	23
76040–56AX357	B–39	29
76040–56AX392	B–6	36
76040–56AX392	B–22	6
76040–56AX1246	B–25	6
76040–56AX2311A	B–6	6
76040–58AX218	B–35	34
76040–61AX53	B–10	27
76040–61AX57	B–50	16
76040–61AX68	B–10	29
76040–63AX1	B–48	11
76040–63AX3	B–23	39
76040–63AX3	B–28	3
76040–63AX3	B–34	57
76040–63AX3	B–39	12
76040–63AX4	B–23	14
76040–63AX4	B–34	50
76040–63AX4	B–50	15
76040–63AX4	B–50	17
76040–63AX27	B–14	14
76040–63AX45	B–14	2
76040–63AX45	B–23	38
76040–63AX45	B–48	18
76040–63AX305	B–34	25
76040–63AX305	B–44	4
76040–63AX308	B–49	8
76040–63AX310	B–44	9
76040–63AX329	B–34	12
76040–63AX329	B–45	21
76040–63AX330	B–34	26
76040–63AX330	B–45	4
76040–63AX330	B–49	2
76040–63AX355	B–24	11
76040–63AX361	B–39	20
76040–63AX362	B–21	9
76040–63AX363	B–34	2
76040–63AX372	B–39	27
76040–63AX376	B–21	13
76040–63AX440	B–22	11
76040–63AX440	B–49	3

Part Number	Figure No.	Item No.
76040–63AX483	B–21	11
76040–63AX494	B–39	22
76040–63AX495	B–39	18
76040–63AX520	B–39	32
76040–63AX582	B–48	27
76040–63AX873	B–34	49
76040–63AX878	B–48	22
76040–63AX889	B–34	56
76040–63AX891	B–10	28
76040–63AX891	B–22	26
76040–63AX929	B–34	58
76040–63AX1214	B–49	12
76040–63AX1221	B–45	10
76040–63AX1221	B–50	6
76040–63AX1842	B–49	7
76040–63AX3059	B–34	32
76040–63AX3225	B–39	11
76040–83AX55	B–24	4
76040–83AX226	B–21	7
76040–83AX226	B–45	3
76040–83AB275	B–25	9
76040–83AX452	B–48	24
76040–83AX454	B–39	15
76040–83AX582	B–34	47
76040–83AX655	B–34	46
76040–97AX207	B–15	8
76040–100AX66P15	B–39	21
76040–234AX8	B–25	4
76040–234AX9	B–29	5
76040–234AX15	B–30	10
76040–236AX15	B–14	5
76040–676AX1	B–21	6
76040–745–56AX1	B–55	24
76040–626BA1138P1	B–15	11
76040–79–BK7949A	B–38	4
76040–1CF1298	B–20	3
76040–1CF1708	B–10	26
76040–18GB134	B–25	21
76040–23GB28	B–54	9
76040–25GB183	B–35	41
76040–26GB412A	B–35	8
76040–34GB11A	B–10	23
76040–44GB2123	B–18	13
76040–44GB2124	B–18	3
76040–59GB122B	B–20	8
76040–59GB188AP1	B–20	11
76040–59GB1109AP1	B–20	9
76040–59GB1122P1	B–20	10
76040–61GB14B	B–30	13
76040–61GB15C	B–30	15
76040–64GB11279P1	B–12	6
76040–64GB11279P10	B–12	6
76040–64GB11279P20	B–12	6
76040–64GB11282AP1	B–12	4
76040–64GB11282AP10	B–12	4
76040–64GB11282AP20	B–12	4
76040–64GB11283AP1	B–12	3
76040–64GB11283AP10	B–12	3
76040–64GB11283P20	B–12	3
76040–64GB11316P1	B–12	5
76040–64GB11316P10	B–12	5
76040–64GB11316P20	B–12	5
76040–886B165	B–51	1
76040–102GB117P1	B–12	11
76040–136GB228A	B–43	10
76040–138GB27A	B–35	46
76040–138GB115A	B–35	20
76040–138GB120	B–35	26
76040–143GB19	B–22	15
76040–146GB172A	B–18	12
76040–146GB225A	B–18	16
76040–158BG237	B–9	12
76040–158GB238	B–9	1
76040–158GB248	B–9	1
76040–158GB249	B–9	12
76040–158GB3137	B–8	3
76040–180GB132	B–25	38
76040–180GB135	B–16	7
76040–180GB135	B–39	14
76040–180GB137	B–39	26
76040–186GB127	B–35	28
76040–186GB133	B–9	17
76040–186GB160	B–50	11
76040–186GB161	B–50	14
76040–187GB11	B–15	9
76040–222GB23	B–16	3
76040–225GB43	B–45	1
76040–226GB117A	B–23	18
76040–226GB117A	B–23	24
76040–226GB126	B–25	36
76040–227GB11	B–18	4
76040–237GB13	B–43	6
76040–236GB240	B–23	28
76040–236GB241	B–23	9
76040–237GB16	B–44	7
76040–240GB5108	B–24	17
76040–253GB1269	B–16	5
76040–255GB16	B–45	5.4
76040–270GB14	B–34	18
76040–270GB29	B–45	14
76040–270GB212	B–45	15
76040–270GB213	B–45	6
76040–270GB214	B–45	22
76040–302GB2188A	B–11	6
76040–303GB4122	B–54	7
76040–308GB15	B–34	1
76040–308GB118	B–34	11
76040–312GB327AP2	B–22	10
76040–320GB11A	B–55	8
76040–320GB169B	B–29	23
76040–325GB131	B–50	3.9
76040–337GB247	B–16	8
76040–338GB11C	B–10	3
76040–340GB11A	B–10	23
76040–340GB142	B–14	9
76040–350GB231	B–26	14
76040–358GB332	B–16	14
76040–358GB390	B–16	18
76040–360GB339	B–50	7
76040–370GB25	B–17	7
76040–404GB3131	B–11	5
76040–417GB13B–P1	B–18	19

Part Number	*Figure No.*	*Item No.*
76040-435GB3150	B-23	8
76040-435GB3151	B-23	8
76040-439GB386	B-48	4
76040-446GB138B	B-18	14
76040-497GB167	B-35	8
76040-447GB145A	B-50	3.2
76040-483GB319A	B-43	1
76040-485GB177	B-23	36
76040-485GB3150	B-23	35
76040-485GB3151	B-23	35
76040-493GB155	B-48	26
76040-493GB163	B-22	3
76040-493GB163	B-48	25
76040-493GB382	B-22	5
76040-493GB2142A	B-22	16
76040-493GB2157	B-22	32
76040-497GB1139	B-34	10
76040-497GB1147	B-25	15
76040-498GB121	B-34	55
76040-498GB122	B-35	23
76040-509GB1205	B-54	4
76040-509GB1222	B-54	6
76040-530GB4267	B-13	4
76040-538GB11	B-20	4
76040-541GB11	B-6	2
76040-541GB13	B-6	44
76040-541GB13	B-54	8
76040-541GB18	B-6	14
76040-541GB18	B-54	10
76040-548GB41A	B-17	1
76040-549GB114A	B-6	33
76040-549GB114A	B-22	9
76040-553GB178A	B-9	19
76040-553GB3234A	B-9	19
76040-554GB38	B-6	1
76040-554GB38	B-7	4
76040-554GB38	B-16	11
76040-559GB38	B-7	1
76040-560GB12A	B-7	2
76040-560GB12A	B-6	30
76040-560GB12A	B-27	6
76040-562GB11A	B-34	8
76040-562GB14	B-35	7
76040-573GB135	B-6	42
76040-573GB135	B-7	16
76040-573GB135	B-28	1
76040-573-GB144	B-6	31
76040-573GB144	B-7	13
76040-573GB144	B-27	4
76040-579GB317	B-6	5
76040-579GB317	B-24	1
76040-590GB12A	B-7	10
76040-590GB190B	B-6	18
76040-590GB190B	B-35	10
76040-590GB236	B-6	38
76040-590GB236	B-17	3
76040-590GB245	B-6	10
76040-590GB245	B-25	13
76040-590GB1109B	B-6	7
76040-590GB1109B	B-23	25
76040-590GB1122A	B-6	22
76040-590GB1122A	B-25	10
76040-590GB1127	B-6	34
76040-590GB1127	B-7	10
76040-590GB1127	B-33	7
76040-590GB1134	B-6	4
76040-590GB1134	B-7	17
76040-590GB1134	B-48	5
76040-590GB1143	B-6	39
76040-590GB1143	B-7	6
76040-590GB1143	B-34	36
76040-590GB1146	B-55	19
76040-590GB1167A	B-6	11
76040-590GB1167A	B-7	14
76040-590GB1167A	B-39	5
76040-590GB1176	B-6	35
76040-590GB1176	B-21	5
76040-590GB1189	B-6	6
76040-590GB1189	B-7	1
76040-590GB1189	B-39	23
76040-590GB1205	B-6	13
76040-590GB1209	B-6	40
76040-590GB1209	B-45	20
76040-590GB1210	B-6	8
76040-590GB1210	B-25	7
76040-590GB1222	B-6	16
76040-590GB1229	B-43	5
76040-590GB1234	B-6	17
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76040-605GB11B	B-6	46
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76040-610GB216	B-50	3.1
76040-667GB21A	B-30	11
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76040-670GB213C	B-12	10
76040-673GB238	B-13	6
76040-678GB227A	B-29	2.2
76040-678GB229A	B-29	2.1
76040-681GB13	B-58	1
76040-681GB14	B-59	23
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76040-59GBA1123	B-20	7
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76040-64GBA11321	B-12	1
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76040-64GBA11323	B-12	1
76040-239GBA1465	B-10	12
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76040-353GC1616	B-15	2
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76040-421GC121	B-16	1
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76040-446GC175	B-35	13
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76040-446GC210A	B-14	6
76040-446GC1108	B-50	3.7
76040-446GC1130	B-9	18
76040-446GC1138	B-6	24
76040-446GC1138	B-14	10
76040-447GC146	B-6	45
76040-447GC146	B-7	3
76040-447GC146	B-48	6
76040-447GC148	B-6	23
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76040-454GC4160	B-20	14
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76040-466GC175	B-7	12
76040-466GC175	B-14	8
76040-466GC175	B-35	13
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76040-469GC191C	B-50	3.3
76040-469GC191C	B-50	6
76040-492GC236	B-25	14
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76040-509GC3153P1	B-15	3
76040-513GC19	B-34	7
76040-518GC113	B-50	3.5
76040-537GC111A	B-29	17
76040-537GC116	B-11	1
76040-550GC148	B-50	8
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76040-574GC15	B-18	15
76040-575GC172	B-19	4
76040-575GC173	B-19	3
76040-610GC1116	B-9	16
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76040-616GC116A	B-9	11
76040-616GC126	B-21	4
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76040-635GC117	B-35	17
76040-636GC328	B-25	12
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76040-690GC122	B-19	7
76040-695GC119	B-21	12
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76040-697GC111	B-34	52
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76040-701GC11A	B-20	5
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76040–509GCA120	B–15	1
76040–509GCA123	B–15	4
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76040–10MJ311	B–45	5.8
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76040-215SB87	B-37	26
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76040-343SB64	B-36	37
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76040-347SB12	B-38	18
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76040-365SB60	B-38	1
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By Order of the Secretary of the Army:

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